MARINE REVIEW

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FIGURING ON NEXT YEAR.

A SITUATION IN EVERY WAY FAVORABLE TO THE VESSEL INTERESTS OF THE GREAT LAKES—GRAIN CANNOT BE MOVED THIS FALL AND CHARTERS ARE BEING MADE FOR THE SPRING OF 1900.

A strong point in the future of lake business, and in fact the various important interests connected with the shipping of the great lakes, is the announcement that the grain shippers of Duluth have paid 3½ cents freight for vessels to load wheat for Buffalo within ten days after the opening of navigation in 1900, and are still offering that figure for more vessels. A grain freight of 3½ cents is equal to $1.30 a ton on ore. This action on the part of the grain interests means that the shippers of the northwest are already satisfied that it will be impossible to move the full portion of the crop which it was intended to forward to the seaboard this fall, and their view of the vessel situation for next year prompts them to offer high freights now, in order to make certain of the ship capacity which they will need next spring. It means also that the ore dealers, who will begin to close contracts for next year's output of ore much earlier than usual, will probably be called upon to make allowance for lake freight in excess of $1 a ton on season contracts from the head of Lake Superior. All speculation as to next year's business is, of course, uncertain as yet, but it would seem that this action of the grain shippers should have an important bearing on the ore sales. In their dealings with the consumers of ore, the mining companies will have as a basis for high prices these transactions in grain freights. This is what has caused rumors of $1.25 a ton being offered on ore freight contracts. It can not be learned, however, that there is anything definite in these reports, and the chances are decidedly against truth in them, as nothing can be done as yet towards fixing prices of ore for 1900. But it is enough to know, from the vessel man's view of very high freights for next year's contracts, that the ore dealers can fix prices at the highest figures they may attempt within reason. Furnace men are already pleading with the ore dealers to care for them in liberal supplies, no matter what the prices may be. If the present great strength of the iron and steel industry continues into the winter, and sales are made on such a basis to admit of more than $1 lake freight, it is more than probable that contracts will be on a large scale. If $1,25 is offered it will certainly be regarded as all that should be paid and the entire tonnage of ore for 1900 (furnaces now consuming it on a basis of 16,000,000 gross tons annually) will be covered up in a few days. This is evidently what is feared by the grain shippers of Duluth, who are now trying to charter vessels for next spring.

LORAIN HARBOR.

It would certainly seem from numerous reports regarding the deplorable condition of Lorain harbor that the people of that place are not alive to the possibilities of a great business that ought to be built up around the large industries in steel and ship building lines already established there. Within the past few days dispatches have told of a dozen or more vessels, all of them big carriers, that have been aground in Lorain harbor, and it has not been learned that a decided move of any kind has been made in the direction of remedying the trouble. The list includes the A. P. Wright, Constitution, 118, Maia and several others.

"Lorain will soon be little better than Sandusky in the opinion of vessel men, if this sort of thing keeps on," said the head of one of the big ore carriers when it was announced Thursday that another vessel was aground. "Sandusky neglected needed channel dredging, and the trouble went on until vessel owners absolutely refused to send their ships there, and thousands of tons of ore consigned to Sandusky was changed to other ports. If the government officials are slow in doing the necessary work at Lorain it would seem short-sighted policy on the part of the citizens of that place that they do not take hold of the matter, and at once."

CONTRACT FOR AN ORE CARRIER.

A contract has been closed by the American Ship Building Co. of Cleveland for the construction of a steel steamer for Mr. W. C. Rhodes of Cleveland. The vessel will engage in the iron ore carrying trade. This vessel will be the twelfth which the ship building company has contracted to deliver this year.

Extensive changes have been made in the navy yard apprentice system by an order just issued by Acting Secretary Allen. Heretofore there has been no rule for the appointment and education of the apprentices, but now the commandants at the various navy yards are instructed to receive applications from candidates, hold examinations and make up lists of eligibles from which appointments may be made. Physically the examinations will be quite severe. Candidates must also be between the ages of fifteen and seventeen years, be able to read and write and have a knowledge of arithmetic up to decimals.

Mr. P. J. O'Reilly, well known to everybody who has anything to do with ships in New Orleans, has been calling on a few friends in Cleveland and Buffalo during the past week. Fifty years ago Mr. O'Reilly was on the lakes sailing out of Cleveland. He settled in New Orleans later and has for a great number of years been prominently identified with the advancement and welfare of that city. He will be in New York shortly, where he will witness the international yacht races and meet members of the Board of Steam Navigation at the annual meeting of that organization during the races.

NEW CONTRACTS FOR VESSELS.

The Pusey & Jones Co., Wilmington, Del., has just secured the contract from a New York firm for the construction of a side-wheel steamer for use in passenger and freight service in Ecuador. The boat with its machinery will be shipped in sections to Guayaquil, at which point it will be erected and riveted. The vessel just ordered will make the twelfth built by the Pusey & Jones Co. for this service.

C. G. White has selected a site for his new ship yard on Puget sound near Everett, Wash. The citizens of the town have awarded him a cash bonus.

The plant of the Truscott Boat Co. of St. Joseph, Mich., was destroyed by fire a few days ago, resulting in a loss of $50,000 on the buildings and machinery. The plant was insured for $25,000. Many boats and launches almost at the stage of completion were destroyed.

A. Loring Swasey and Arthur Raymond, late employes of the Wm. Cramp & Sons Ship & Engine Building Co., have joined with Mr. Brown, the Taunton, Mass., boat builder, in the establishment of the Taunton Yacht Works. The equipment of the yard formerly operated by Mr. Brown will be enlarged and improved.

The firm of Cobb, Butler & Co. of Rockland, Me., have closed a contract with R. R. Freeman of Boston for the construction of a three-masted schooner of about 550 tons. The vessel, which will be launched in January, will be 148 feet keel, 35 feet beam and 14 feet depth of hold.

The Columbian Iron Works, Baltimore, Md., has launched the sea-going steel tug Savage. She is 152 feet in length, 27 feet beam and 15 feet depth of hold. She will be fitted with triple expansion engines and will engage in the service of towing coal barges between Baltimore and Boston and other New England ports.

POWER CANAL AT THE SAULT.

In justice to commercial interests at Sault Ste. Marie, the following letter, defining the position of the Lake Carriers' Association regarding the power canal that is being constructed at that point, was written, a few days ago, by President Firth of the association:

"To prevent any wrong impression on the part of those interested in the welfare of the Sault, permit me to say the Lake Carriers' Association is not opposed to the completion and operation of the Sault power canal. The association merely asks that before the canal is used there shall be remedial works constructed that will maintain the Lake Superior levels, avoid a dangerous current at the canal outlet and maintain the levels in the river below the canal. Remedial works that will insure these results should be constructed and currently maintained under direction of the United States. This is the reasonable position of the Lake Carriers' Association, and it has been cordially accepted and endorsed by the management of the canal company. The canal company clearly admits that the canal must be so constructed and operated that it will in no way endanger lake navigation interests. It is not necessary to refer in this brief letter to the possible interest of the Canadian government in this question."

NAVAL ARCHITECTS' ANNUAL MEETING.

It was apparent, even during the 1898 meeting of the Society of Naval Architects and Marine Engineers, that the 1899 gathering of the organization would prove of exceptional interest and value. This fact has become more and more apparent as the time for the meeting draws near, owing to the importance of some of the subjects to be considered. The meeting will be held in New York City on Thursday and Friday, Nov. 16 and 17. At the last annual meeting of the society the following resolution was adopted:

"That papers be invited upon the subject of life-saving at sea for the next annual meeting and that two such papers be selected for publication and discussion."

One of the papers on the subject will be by Mr. John R. Hyslop, measurer of the New York Yacht club, who was one of the survivors of the Mohegan disaster. The secretary of the society requests that any other papers submitted on the subject should be received by Oct. 1.

IMPROVEMENTS AT THE CRAMP YARD.

The Wm. Cramp & Sons Co. has applied to the board of port wardens of Philadelphia for permission to erect piers and drive piling on the ten-acre tract recently purchased from the Lehigh Valley railway, which adjoins the Cramp property on the north and mention of which has several times been made in the columns of the Marine Review. The new ground has a water frontage of 300 feet and runs back about 1,500 feet. On this ground will be laid keels for the two new 12,000-ton steamers for the International Navigation Co. and also a large new shop for the construction of engines. The new shop is to have 90,000 feet of floor space. Although the Cramp company some days ago notified the navy department that a strike existed at its yards, the trouble is far from widespread. The temporary laying off of 1,500 men some days ago was, we are informed, necessitated solely on account of inability to secure material from the steel mills.

Corrigan, McKinnie & Co., ore dealers of Cleveland, who bought ten wooden vessels during the past two months, so as to insure the movement of their ore next year and for the balance of the present season, have added another steamer to their fleet—the M. M. Drake, said to have been bought at $35,000. J. P. Nagle and others of Toledo have purchased the steamer Aztec and consort Miztec, and the Lehigh Valley Transportation Co. of Buffalo has sold to Frank B. Baird, president of the Union Iron Works of the same place, the steamers Fred Mercer and H. E. Packer.

TURBINE PROPULSION.

THE TORPEDO BOAT DESTROYER IN WHICH THE PARSONS SYSTEM HAS BEEN UTILIZED AND ALSO A PROPOSED OCEAN LINER.

The Review has on several occasions referred to the torpedo boat destroyer of the Parsons turbine kind recently completed for the British admiralty, and reference has also been made to drawings prepared by Mr. Parsons for an ocean liner to embody this same means of propulsion. We herewith reproduce from Engineering of London drawings of both of these vessels. The plant of the Parsons Marine Steam Turbine Co. is now equipped with machinery for manufacturing turbine engines up to sizes suitable for the largest vessels. The company was formed in 1897 and the plant now covers an area upwards of 23 acres at Wallsend on the river Tyne. Machinery throughout the entire works is electrically driven. The shops are of iron with roofs of glass, dulled on the outside by a thin coating of whiting and tallow. In this way an ample and diffused light is obtained, while the heat of summer is modified. For heating in winter the exhaust steam from the turbos is discharged into three rows of 4-inch pipes running the full length of the shops on each side. The condensed water is collected in tanks for use. The principal machine shop is 360 feet in length by 80 feet in width. There are three traveling cranes of ten tons capacity each, and various small jib cranes.

It was at these works that the turbine propelling machinery for the new torpedo boat destroyers for the British government was manufactured. The engines are similar in design to those of the Turbinia, but differ from the latter in so far as they are each composed of two separate sets of engines for port and starboard sides of the vessel. There are also four propeller shafts, against three in the Turbinia. On each side of the vessel is one high-pressure turbine motor driving the outer screw shaft, and one low pressure and one small reversing turbine motor driving the inner screw shaft. The collective horse power for the two sides of the vessel when steaming ahead is upwards of 10,000, and the estimated speed somewhat over 35 knots, and when going astern the estimated horse power developed will be sufficient for attaining 16 knots. The engines have, however, been designed to give a margin of power. On each side of the vessel is a surface condenser, each with two air pumps driven by turbines, or four in all, and two circulating pumps driven by ordinary double-acting engines. There is a complete system of forced oil circulation for the main engine bearings. The feed arrangements consist of two steam pumps and a stand-by pump, of the Weir type. The engines, while designed to develop double the horse power of the present 30-knot destroyers, are of less weight, which has permitted of an increase of about 12 per cent in the size of the boilers. It is further anticipated that the consumption of steam per horse power realized will be much less than that of reciprocating engines of this class.

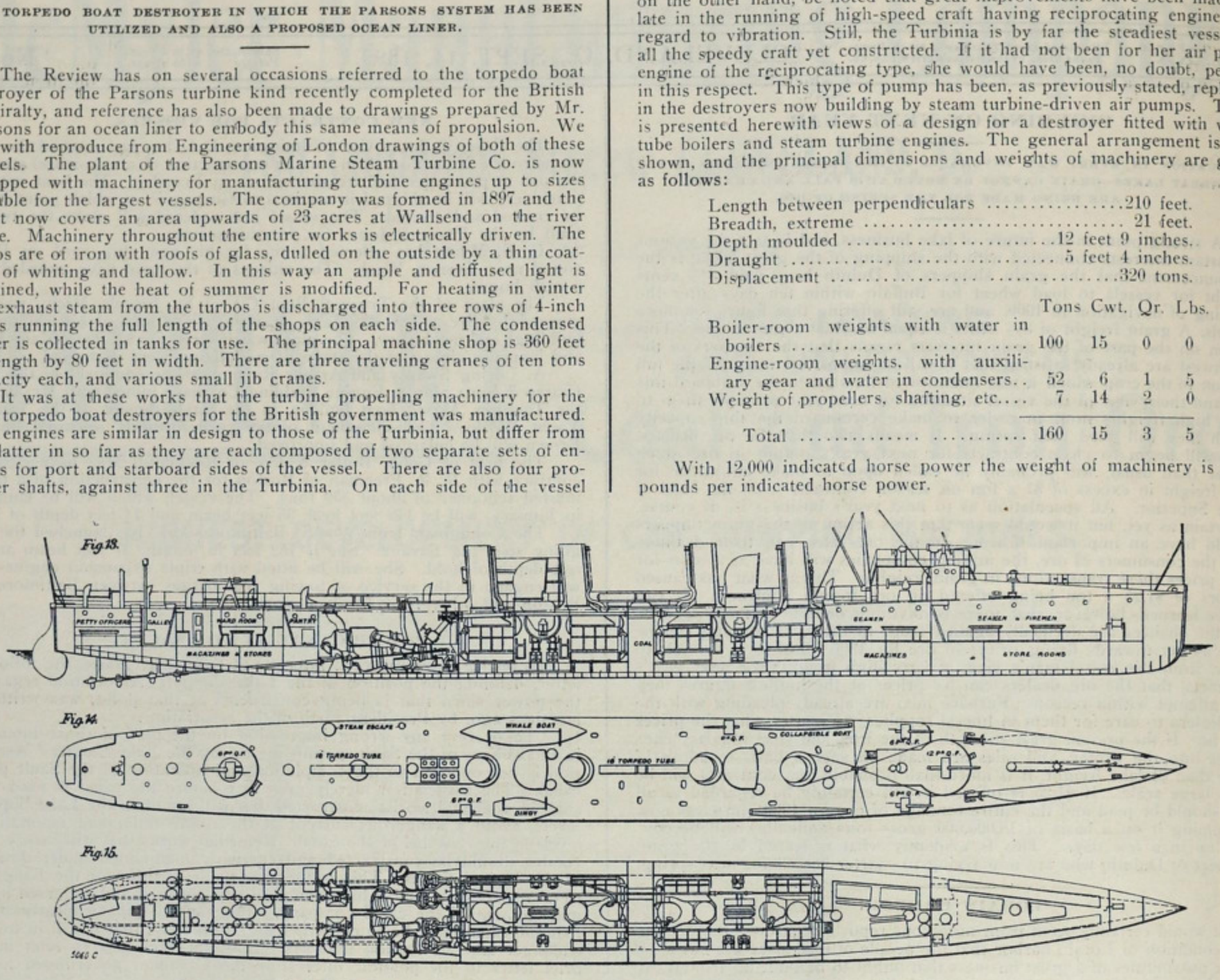
In a torpedo boat destroyer the advantages that are claimed for the substitution of compound steam turbine machinery are primarily a great reduction of engine-room weights, and also a reduction in the weights of shafting and propellers. There are, however, also the advantages of a lowered center of gravity of the engines, and a considerable increase of steam efficiency in the engines, together with an almost complete immunity of vibration arising from machinery or propellers. This freedom from vibration was especially noticeable in the Turbinia when running at any speed. It follows necessarily that the weight saved in the machinery will allow of larger boilers, the increase in a destroyer of 310 tons displacement being, it is claimed, about 2,000 additional square feet of heating surface. With the increased economy in the use of steam by the engines—estimated at from 20 to 25 per cent—and the larger boilers, a higher power can be realized at ordinary full speeds; and this can be obtained with less forcing of the boiler, and, therefore, better boiler economy. Naturally, on an emergency a very much greater power and speed may be realized without straining the machinery.

Owing to the lightness of the engines, they can be made with a larger margin of strength and capacity than is usual with reciprocating engines. It should be noted that when the larger boilers are worked to their full capacity, the steam is utilized with a great degree of efficiency, and in this way the exceptional speeds anticipated will, it is hoped by the designers, be readily obtained. Beyond this it is claimed that the immunity from vibration will enable the guns and torpedoes to be sighted with much greater accuracy; the sights can be clearly and steadily observed while the vessel is traveling at full speed in a moderate seaway. It should, however, on the other hand, be noted that great improvements have been made of late in the running of high-speed craft having reciprocating engines, in regard to vibration. Still, the Turbinia is by far the steadiest vessel of all the speedy craft yet constructed. If it had not been for her air pump engine of the reciprocating type, she would have been, no doubt, perfect in this respect. This type of pump has been, as previously stated, replaced in the destroyers now building by steam turbine-driven air pumps. There is presented herewith views of a design for a destroyer fitted with water tube boilers and steam turbine engines. The general arrangement is well shown, and the principal dimensions and weights of machinery are given as follows:

Length between perpendiculars	210 feet.
Breadth, extreme	21 feet.
Depth moulded	12 feet 9 inches.
Draught	5 feet 4 inches.
Displacement	320 tons.

	Tons	Cwt.	Qr.	Lbs.
Boiler-room weights with water in boilers	100	15	0	0
Engine-room weights, with auxiliary gear and water in condensers	52	6	1	5
Weight of propellers, shafting, etc.	7	14	2	0
Total	160	15	3	5

With 12,000 indicated horse power the weight of machinery is 30.01 pounds per indicated horse power.



DESIGN FOR TORPEDO BOAT DESTROYER WITH PARSONS STEAM TURBINE MOTORS.

In the design of a 30-knot torpedo boat destroyer of similar size, the weight of machinery is as follows:

	Tons.
Boiler-room weights with water in boilers	78
Engine-room weights with auxiliary gear and water in condensers	56
Shafting and propellers	10
Total	114

With 6,000 indicated horse power the weight of machinery is 53.76 pounds per indicated horse power. It should also be stated that there is claimed a considerable difference in hull weights when the vessel is propelled by turbine machinery, as no special strengthening is necessary under the engines or near the screws, owing to the absence of vibration.

As has already been stated, the consumption of steam in the case of the turbo-electric generators of the condensing type is in the larger sizes exceptionally low. As there is no means of indicating the steam turbine, recourse was made by Professor Ewing in his tests of the Turbinia to the calculated resistance of this vessel from model experiments on the lines first laid down by the late Mr. Froude, and since generally adopted for ascertaining the actual horse power required to tow the vessel at the speed. On this basis Professor Ewing based a curve giving the horse power at any speed up to 32 knots. He also made careful measurements of feed water pumped into the boiler at a number of different speeds. From these he deduced that the consumption of steam for all purposes at a speed of 32 knots was 28 pounds per propulsive horse power, or on the basis of 55 per cent of propulsive to indicated horse power amounted to 14½ pounds of steam per indicated horse power, and prolonging the curve (which is regular) to the speed of 34 knots, the calculated consumption falls to 13¾ pounds per indicated horse power. These results, which are remarkable in a vessel of the torpedo boat type running at high speed, are held to account in a large measure for the performances of the Turbinia. The engines of the torpedo boat destroyers recently constructed at the Turbinia works are designed to develop about five times the power of the Turbinia's engines. It is noted also that further improvements have been adopted by which it is anticipated that a still greater degree of economy of steam will be obtained.

Though the steam turbine has been first designed for small vessels of exceptional power and speed, there is held to be no reason to prevent its application also to fast vessels of larger size, including ocean liners, cruis-

ers, and passenger vessels of channel-service kind; and it is claimed that the advantages in these latter cases would be as great as in the former instances. It is also said experience has shown that the larger the scale on which the engines are made the greater is the ease in fulfilling the conditions for the highest economy in steam, with a minimum of weight. Although at present the proposal to build an ocean liner to be fitted with steam turbine machinery has not taken further practical shape than the getting out of a design, the circumstances under which this new form of motor is coming forward are so exceptional that the publication of the accompanying engravings will prove of interest. The drawings include a profile view, partly in section, together with deck plan and cross-sections of an ocean liner for which the company have proposed to supply machinery. The following are the principal dimensions and weights as estimated for the design:

Length between perpendiculars	600 feet.
Breadth, extreme	63 feet 3 inches.
Depth moulded	42 feet.
Draught to bottom of keel	28 feet.
Displacement	18,000 tons.
Total bunker capacity	5,000 tons.

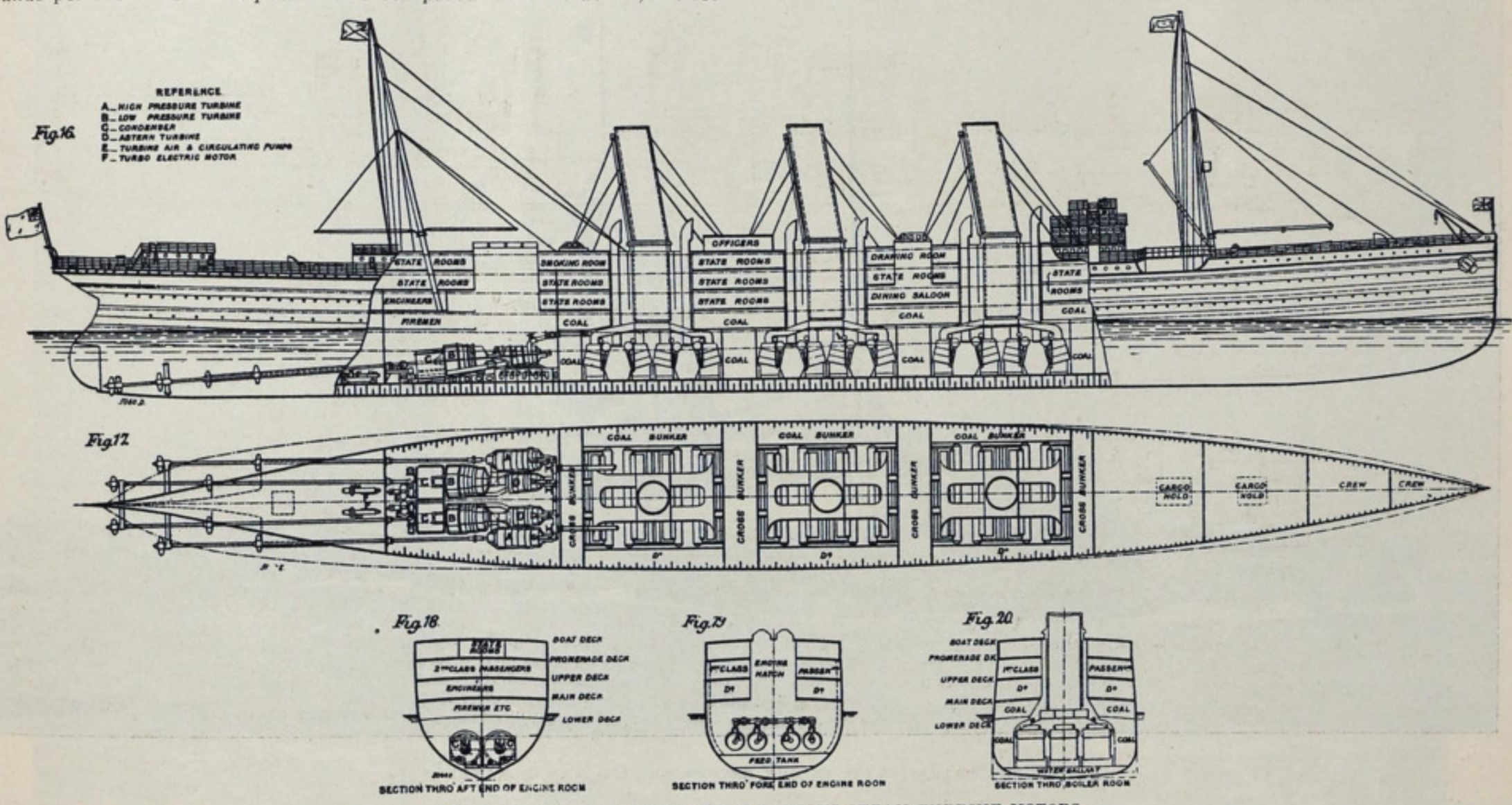
	Tons.
Boiler-room weights with water in water tube boilers	1364
Engine-room weights with auxiliary gear and water in condensers	822
Shafting and propellers	210
Total	2396

With 38,000 indicated horse power, the weight of machinery is 141 pounds per indicated horse power. As compared with the above, the following are given as the weights for a similar vessel with reciprocating engines and Scotch boilers:

	Tons.
Boiler-room weights with water in boilers	2225
Engine-room weights with auxiliaries and water in condensers	1220
Shafting and propellers	305
Total	3750

With 26,000 indicated horse power, the weight of machinery is 323 pounds per indicated horse power. A vessel of the above size, and fitted with the steam turbine machinery and water tube boilers, would, it is estimated, have an ocean speed of 26 knots. The advantages which, it is claimed, would result from the substitution of steam turbine machinery in a liner would be: Reduction of total engine room weight to about one-half that of ordinary engines; a small reduction in steam consumption per indicated horse power; complete freedom from all vibration from the main engines, and a great reduction of vibration from the screw propellers; smaller engine room staff to deal with the simpler and lighter engines and shafting; less consumption of oil and stores.

Commenting on the above, it may be remarked that the perfect balancing of the engines permits of very light engine-room foundations, and obviates that stress or strain on the hull which is produced by the reciprocating forces of ordinary engines. The absence of lubricant from the internal parts of the engines is a benefit to the condensers and boilers. It diminishes the cost of cleaning and repairs, and enables very high boiler pressures to be used without risk. It is proposed that the steam should be reheated between the high and low pressure cylinders by coils of steel tubes containing steam at boiler pressure. Compound feed heaters, supplied with steam drawn from several points in the expansion in the main engines, would raise the temperature of the feed to above 212 degrees Fahr. The exhaust from the auxilaries would also be added to one or more of the heaters. The trials of the Turbinia showed a total consumption of steam for all purposes of 14½ pounds per indicated horse-power of the main engines at 31 knots, but in a liner the consumption would undoubtedly be less, owing to the larger size and more perfect expansion, the higher boiler pressure, better vacuum and other minor details. Smaller size of the screw propellers diminishes vibration due to uneven action of the blades in the stream lines of the vessel. Smaller diameter also permits of some 8 feet more immersion above the tips of the blades, so that the evils of screw racing in heavy weather will be mitigated, and the vessel better able to keep her speed. With the steam turbine the turning moment on the shafting is absolutely uniform, and these engines have much more momentum (or flywheel inertia) than ordinary engines. They will, therefore, not gather speed so quickly should the screws top the surface, and the engine governor will have more time to come into action and prevent racing. The shafting is only about one-half the usual diameter for equal total indicated horse power, and can, therefore, be much more easily dealt with by the staff, and spare parts more easily carried. The four shafts are an additional safety against total breakdown of the engines; and should one of the engines break down, the other three are not interfered with, as they are quite independent excepting as regards the steam supply, which is controlled by valves. The small headroom required for the turbine engines and their quiet working permits of cabins being placed over part of the engine room.



DESIGN FOR OCEAN LINER WITH PARSONS STEAM TURBINE MOTORS.

THE CASE OF CAPT. CARTER.

Editor Marine Review: Referring to your inquiry in relation to the Carter court martial, I wish to say that if the records of the trial could be referred to three disinterested engineers familiar with jetty construction they would without doubt come to an unanimous conclusion that Capt. Carter could not have stolen the amounts of money with which he has been charged without bankrupting the contractors who did the work. There is no question as to the fact that Savannah harbor has been improved for a less cost than similar work has been done for at any other port on the South Atlantic coast, and as we well know that contractors are not in the contracting business for their health, it is a fair presumption that when prices were such that only a legitimate profit could be made (as was shown at the trial) no great division of spoils could have been made with the engineer in charge.

With two exceptions the court was made up of men wholly ignorant of the nature of the problems on which the charges were based, and no doubt were unable to decide in their own minds whether the result of surveys were correctly interpreted or not. Whether Capt. Carter may be decided guilty or innocent, it can be stated with certainty that there is not a government engineer in charge of large and expensive improvements who cannot be convicted on similar charges, if the misleading interpretation of contract specification and results of surveys by unscrupulous witnesses be accepted as evidence, as was the case at the Savannah trial. So far as Capt. Carter's interpretation of the specification under which the work was done is concerned, I know of no disinterested engineer who has examined the work who is not of the opinion that his interpretation was perfectly legitimate.

I think that Mr. Wayne McVeagh hits the key to the whole trouble when he states that a case of the nature of the one in question should never be tried by a military court. GEO. Y. WISNER.

Detroit, Mich., Sept. 7, 1899.

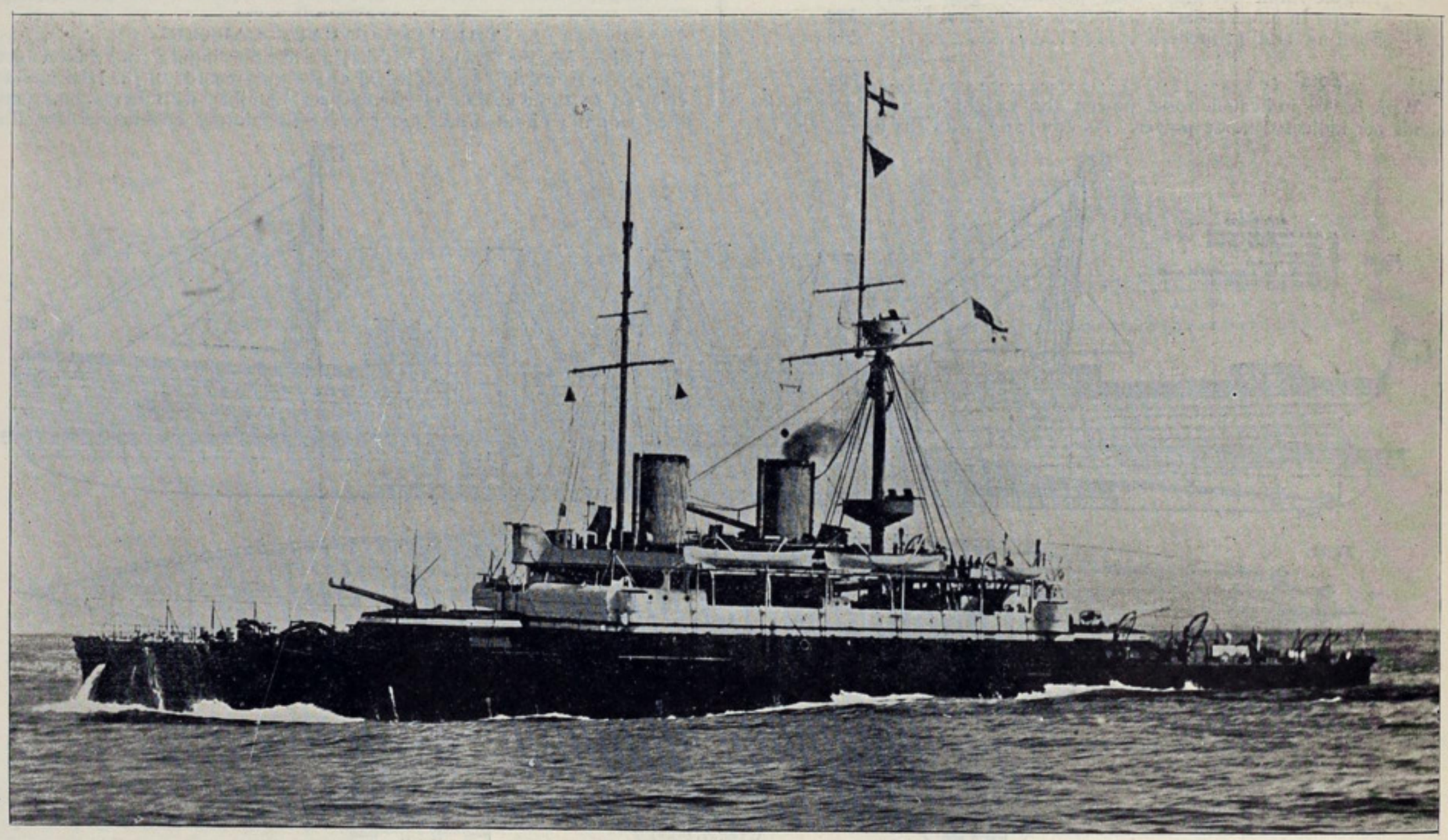
Henry McMorran will take Capt. Alvin Neal's place as manager of the Port Huron Ferry Co. and the different lines of boats managed by the deceased vesselman.

RESPONSIBILITY OF DRY DOCKS.

A LEGAL ACTION OF SPECIAL INTEREST—NO DAMAGES FOR THE COLLAPSE OF A VESSEL IN DOCK WHERE EXCEPTIONAL CONSTRUCTION HAD NOT BEEN PROVIDED FOR.

In this country of late, and especially on the great lakes, there have been several instances of the collapse of vessels in dry dock, followed by actions for damages, and especial interest therefore attaches to a case concluded not long ago in the Liverpool assize court. The action was brought by the Norddeutscher Lloyd Co., as owners of the steamer Fulda, to recover damages for injury to that vessel sustained while in the Birkenhead graving dock No. 2, the property of the Mersey Docks & Harbor Board. Messrs. Clover, Clayton & Co., prominent Birkenhead shipwrights, who undertook the docking of the ship, were also proceeded against as joint defendants with the dock board. The case came before Mr. Justice Bigham and a special jury, and the issue was considered of such moment that the list of witnesses included, among other well known experts, Dr. Francis Elgar of the Fairfield Ship Building Co., Sir. Edward Reed, Sir Fortescue Flannery and Mr. Carlisle, manager for Harland & Wolff. The claim was for $150,000.

Briefly stated, the Fulda was sold through Messrs. H. E. Moss to the Canadian Shipping Co., subject to approval on sighting her bottom. The



ONE OF THE PARTICIPANTS IN THE RECENT BRITISH NAVAL MANEUVERS.

ship was put in dock apparantly satisfactorily. When the dock was pumped dry, however, the Fulda crashed through the blocks, and became a constructive total loss; subsequently provisional total loss. Afterward provisional repairs were effected, and the Fulda was safely floated out of the dock. The question was one as to whether the graving dock blocks were fit and proper to perform the service which was required of them, and whether the shipwrights, Messrs. Clover, Clayton & Co., performed their duties of docking or shoring the ship in a capable manner. Naturally enough the chief onslaught was directed against the dock board, and the prosecution tried to prove that the blocks were defective, in fact, so much so that they were quite incapable of doing what was required of them. It was shown that some three of the blocks had been marked by officials of the board as being defective, yet these were not removed as it was thought they should have been. Besides, out of the total of seventy-two blocks on which the vessel rested, twenty-seven of them were found to have flaws, which, it was contended, weakened them. A considerable amount of expert evidence was called upon this question, which, as usual, varied according to the side on which the specialist was feed. Another point that was raised was the condition of the bearing surfaces of the blocks, and on this, too, a difference of opinion prevailed. Each side was upheld by other witnesses, so that to place reliance upon the numerous experts brought forward would have been impossible, both sides holding different opinions. The evidence against the board in reference to the flaws in the blocks assumed very serious proportions, and it appeared during the trial as if the judge had quite made up his mind that the ship, in smashing the blocks, had done just what might have been expected.

But in the summing up of the case to the jury it was evident that the judge did not, after all, attach great importance to the evidence regarding the condition of the blocks and that the case was looked upon as a unique calamity, due to the exceptional construction of the vessel not having been provided for before docking. The jury regarded the evidence in the same light, and their verdict was that the plaintiffs had not made a case. The firm of shipwrights was first of all declared entirely blameless, as it was shown that in the absence of knowledge regarding the construction of the vessel they had performed their full duty. In summing up the case the judge said:

"The responsibility of the shipwrights, Clover, Clayton & Co., ended with bringing the vessel in to the dock, setting her on the blocks and shoring her up, and when they had done that, they did all they could be fairly expected to do. It was said by the plaintiffs that the dock board and Clover, Clayton & Co. ought to have foreseen that additional blocks were required by reason of the construction of the Fulda, and ought to have supplied them, and were therefore in default in that respect. But the shipwrights had no information given them of what one might call the exceptional character of the ship—all they had was the length, beam and draught of the ship; they were left, so far as the plaintiff was concerned, without this special information to act upon. The dock board did not undertake to do more than provide blocks reasonably sufficient for the purpose intended. The blocks were intended to support the Fulda, but if the Fulda was herself a source of hidden danger, the dock board could not be held liable for not providing against such hidden danger. What they had to do was to provide such reasonable appliances as reasonable men would think necessary under the circumstances. There was no doubt about the cracked condition of the blocks, but whether they had an effect on the accident depended on whether the central plates in them where the flaws existed were really intended, and did as a matter of fact bear any substantial part of the weight of the ship, and so were subject to pressure by it. The evidence went to show that they were not there to support the strain of the vessel, and that it did not in the least matter whether the center piece was cracked or solid so long as the side plates or girders were all right, because it was these girders that supported the ship and not the center pieces. The vessel was one of exceptional character, having an overhang of 108 feet, weighing about 1,000 tons, and it was said that no such ship had ever before come into the port of Liverpool. No doubt similar ships had been built in Germany, and some also by the Fairfield company, which built the Fulda, but that she was an exceptional ship there could be no doubt, requiring, one would think, exceptional treatment in docking. She came in down by the stern, drawing a little more than at the stem; therefore when she took the stern blocks first, and as she settled down on the blocks, she gradually took the blocks forward until at last her keel rested on Block No. 24. The evidence went to show that the greater strain was on No. 24 block, though there might be a conflict as to what the strain was. The water then gradually went out—she had hitherto been waterborne—so that when the blocks were dry the vessel rested entirely on them, and apparently for fifteen minutes or thereabouts, the blocks held her up; then the calamity occurred, and in five seconds the vessel came down with a crash to the bottom. What was the real cause of that? It has been shown that when the vessel rested on the 450 feet length of blocks, there was a vertical pressure above block No. 24 of about 120 tons, and the total pressure on that particular block, taking into consideration the pressure exerted by the overhang, would be about 200 tons; while the average pressure on all the blocks was about 90 tons, it was more than double the average on No. 24. The bearing capacity of the cap being 200 tons, it followed that the cap had just as much as it could bear, and very much more, if the strain, according to estimate was 500 tons. Then the vessel crashed down, according to the plaintiffs, at the point where No. 24 block was situated, but according to the defendants, forward, and their theory that it was caused by the overhang of the Fulda was borne out by the fact that all the damage took place in the fore end of the ship."

OCEANIC FURNISHINGS.

INTERIOR DECORATIONS OF THE LARGEST STEAMER AFLOAT ARE FULLY IN KEEPING WITH OTHER CHARACTERISTICS OF THE VESSEL.

The arrival at the port of New York on her maiden voyage of the White Star liner Oceanic, the largest steamer afloat, has directed fresh attention to this, the greatest product of modern ship building science. The Oceanic, it will be remembered is 704 feet in length, of 28,500 tons displacement and has a capacity of 410 first-class, 300 second-class and 1,000 third-class passengers. This vessel has been very fully described and illustrated in former issues of the Review, except as regards the magnificence of the interior decorations, which are quite in keeping with the other features of the vessel.

The main saloon is 80 feet long by 64 feet wide, and is arranged to seat 350 persons. In the center is a raised trunk, 21 feet square, extending through the upper deck, just above, and, in the form of a glass dome, partly through the promenade deck. The sides of this raised structure are decorated in a most lavish manner. The summit is divided by gilt ribs, the spaces between being filled in with ground glass. This top part takes the form of a shallow dome, which surmounts the square trunk occupying the space between the decks above the saloon deck. The sides of this square are decorated by allegorical female figures representing, respectively, Great Britain, America, New York and Liverpool.

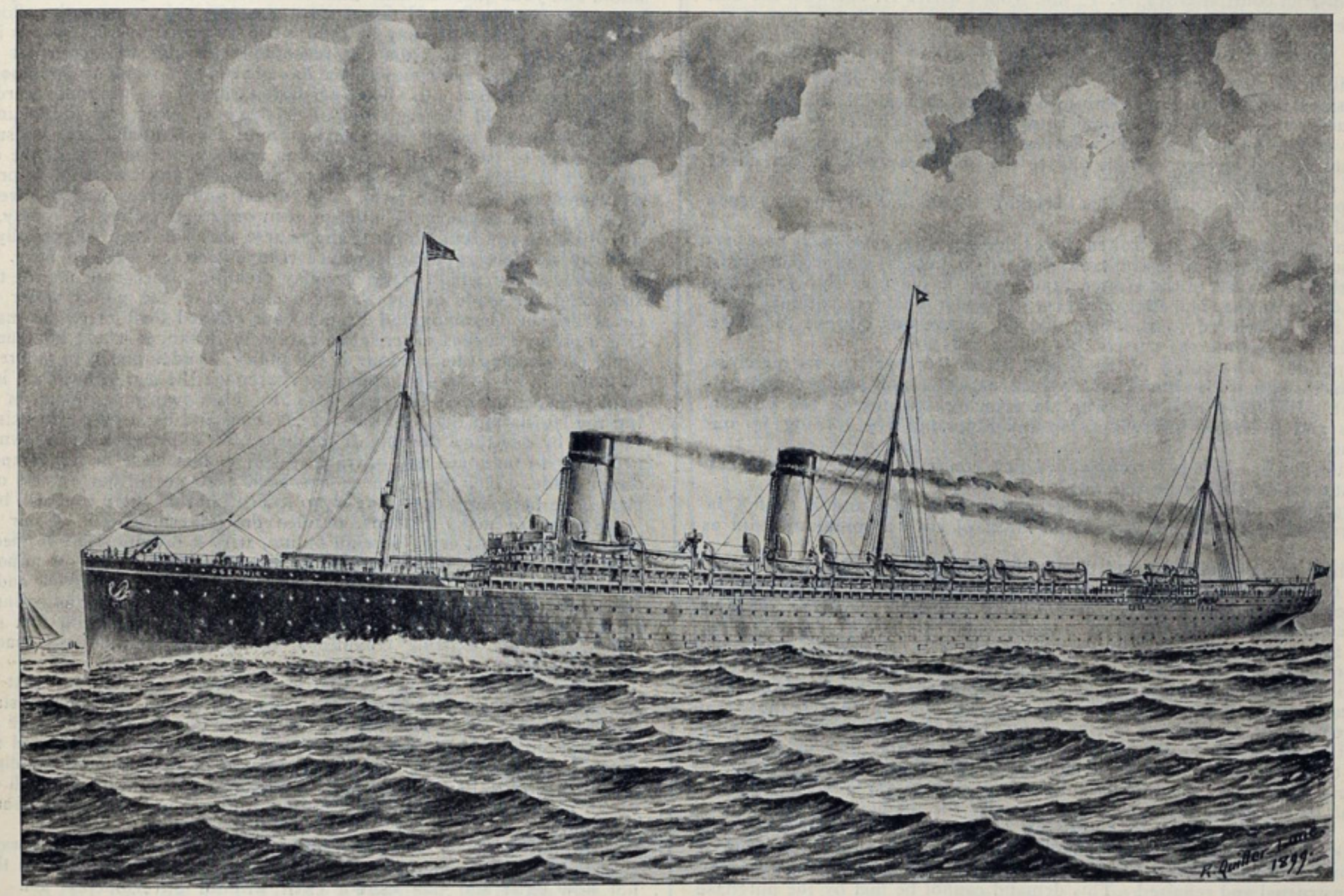
The remaining decoration is of a rich and pleasing character, but no art is able to get over the disproportion of these big saloons necessarily low pitched between decks, although the raised central part aids largely in giving light. The sides of the saloon are of gilt oak, the grain showing through. The side lights or windows are of ground glass, and are about 2 feet 6 inches in diameter. Naturally the ground glass cuts off a good deal of light, and it does not improve the appearance of the room, giving it a somewhat dull aspect. This, however, is redeemed to some extent by the rich crimson Genoa velvet of the seats, whilst the heavy carved and gilt mouldings are exceedingly rich. Across one end is a clear glass screen, which separates the saloon from the staircase. This screen has in front of it a row of polished brass columns, which are very handsome in design and give a most pleasing effect. The staircase leading to the saloon is of oak, and is beautifully carved in conformity with the general design of the interior decoration. The panels are of scarlet and gold, a bright and cheerful contrast.

The saloon being necessarily designed more especially for a useful purpose, artistic arrangement has to be, to some extent, sacrificed to space considerations, so that all may dine—the important business of an ocean voyage. In the library, however, the artistic decorator has fuller scope, and in the case of the Oceanic full advantage has been taken of the opportunity. Being situated on the promenade deck, a better chance is given for a light and spacious room. The dome of the saloon extends about 3 feet up into the library, and this has been utilized to divide the floor space, lounge seats being arranged round the dome. The length of the library is 53 feet and the width 40 feet. The general design is pleasing in the extreme. The sides are not of the orthodox straight line, but are broken up into lengths by the formation of recesses. The side opposite the entrance is formed into a curved bookcase, which is flanked on each side by square alcoves, thus giving a view beyond, which forms so charming a feature in any room, but is seldom seen on shipboard, where walls are mostly of the flat or bulkhead order. The upholstering is of the order known as "Louis XV." There is an octagonal skylight rising 12 feet from the deck. The whole of the walls, the main beams of the ceiling, and the stanchions are ornamented by oak carving, the details not being repeated in stereotyped fashion, but each part representing an original conception of the artist. The windows are not of the usual circular form, and are very beautifully framed; these look out on the long promenade deck. Altogether, this library, which also serves the purpose of a drawing room, is an exceedingly beautiful apartment, and is certainly the choicest feature in the ship.

The remaining living room is the smoking saloon, which is on the upper deck. It is a spacious apartment, handsomely decorated, but not so attractive as the library, which will be chiefly the ladies' room; and, therefore, is appropriately more pleasing in appearance and scheme of decoration. The smoking room has two wagon-shaped domes, the lower parts of which are richly carved. There are monochrome paintings, which represent a bacchanalian procession. The ceiling is formed by carved and moulded ribs with metal work on the flat surfaces. There is a carved mahogany frieze round the room, and the walls are covered with embossed leather. There is a series of oil paintings of scenes from the life of Columbus on the basis of the American Columbian stamps. The general plan of the seating is a number of bays all round the room, the seats being covered with morocco leather.

The second-class passenger accommodation is arranged on two decks at the after end of the vessel, and though handsome and well-designed, is naturally not of the highly ornate and costly character which distinguishes the saloon accommodation. There is a smoking room, library, and writing room. The dining saloon will seat 148 passengers. In the third-class passenger department the single men are accommodated in open berths forward, the single women at the after end, and the married people and children between.

A feature that strikes one at first on coming on board this vessel is the long, wide, and unobstructed walks on the port and starboard sides afforded by the promenade deck. Of course the exceptional size of the ship gives facilities for this, but it is a feature too often neglected by designers of passenger vessels. In fine weather, and often in bad weather too, the promenade deck is where the passenger spends most time between meals, and when one is cooped up in a ship on an ocean voyage it is a great blessing if the promenade deck is not a misnomer.



THE WHITE STAR LINER OCEANIC—LARGEST VESSEL IN THE WORLD—WHICH ARRIVED AT NEW YORK SEPT. 13.

The Baldt Anchor Co. of Chester, Pa., represented on the Great Lakes by Walter Miller of Cleveland, is distributing to its friends and patrons a very handsome little souvenir in the form of a miniature nickel-plated anchor, suitable for a watch charm.

MERCHANT MARINE IN THE FOREIGN TRADE.

IMMEDIATE RESPONSE TO THE REQUEST FOR OPINIONS FROM PATRIOTIC CITIZENS AS TO WHAT, IF ANY, NATIONAL LEGISLATION SHOULD BE ENACTED BY CONGRESS—COMMUNICATIONS FROM THE PRESIDENT OF THE LAKE CARRIERS' ASSOCIATION, FROM JUDGE COXE OF THE UNITED STATES DISTRICT COURT, AND FROM THE FIRST ENGINEER-IN-CHIEF OF THE UNITED STATES NAVY.

When the Review announced, last week, that an expression of opinion would be sought from prominent men in the great lakes district and elsewhere, as to what, if any, legislation should be enacted by congress in order that the United States may increase the number of merchant vessels carrying our flag in the foreign trade, and that these opinions would be submitted to congress when it next assembles, it was not thought that response to this inquiry would be so general as now seems certain. We already have in hand a number of communications that will be printed as soon as possible. In this issue we submit letters from President Frank J. Firth of the Lake Carriers' Association, from Judge Coxe of the United States district court at Utica, N. Y., and from Charles H. Haswell, the first engineer-in-chief of the United States navy.

FROM THE PRESIDENT OF THE LAKE CARRIERS' ASSOCIATION.

Editor Marine Review: The three questions as to which you invite expressions of opinion are certainly worthy of thoughtful consideration.

Question 1: Shall the United States continue to allow its merchant marine in foreign trade to fight a losing battle until it entirely passes out of existence and foreign nations absorb the ocean carrying of our entire import and export trade?

Opinion: The United States certainly should not pursue any such suicidal policy.

Question 2: Shall the United States decide, as its permanent non-partisan public policy, that an equitable share of its imports and exports must be carried on vessels of the United States, built in our own ship yards and flying our own flag, and that congress will enact whatever national legislation may be needed to stimulate and encourage our citizens to create, maintain and operate the vessels this policy calls for?

Opinion: The policy of the United States in respect to its merchant ships in foreign trade should certainly be national, non-political and permanent. It should not vary with the varying fortunes of the political parties and it should stimulate ship building and ship owning by our citizens.

Question 3: If it is recommended that congress shall enact remedial legislation what shall it be and why?

Opinion: This is a very comprehensive question and it cannot be fully replied to within the reasonable limits of such a communication as this.

There are two separate and distinct interests involved in the consideration of our national policy in respect to our foreign merchant marine. We need for the national defense ship yards capable of building, docking and repairing the largest type of modern battleship. We need merchant ships for use as auxiliary cruisers, transports, etc., in time of war. We need officers and sailors to command and man such ships. The naval establishment of a great nation demands ship yards, merchant ships, officers and men. These demands can only be met by the creation and maintenance of a merchant marine of our own that will sustain our ship yards; place vessels at our disposal when needed; and give us a trained force of officers and men for naval service. The first interest involved in the consideration of our national policy in respect to our foreign merchant marine is, therefore, the governing necessity for maintaining an efficient naval establishment for our protection in time of war. This important interest demands not only merchant vessels but, far more important, it demands ship yards of our own where our naval and merchant vessels may be constructed and repaired. This demand cannot be met by the purchase of our naval or merchant ships from the ship yards of foreign nations, no matter how cheaply such nations may be willing, in time of peace, to supply such ships. The United States will not consent to be dependent on foreign nations for its ships.

The other important interest involved in the consideration of our national policy in respect to our foreign merchant marine is the question as to the effect of that policy upon the prosperity of all of our people. It has been estimated that from $125,000,000 to $250,000,000 is paid annually for the ocean carriage to and from the United States, on both oceans, of passengers of all classes and of import and export freight. We will call the amount $200,000,000 for ease in reference and because it is supposed to be approximately correct. Of this amount about 10 per cent is said to be paid to vessels of the United States, leaving $180,000,000 to be paid to vessels of foreign nations. This $180,000,000 supports foreign ship yards; pays interest upon many millions of dollars invested abroad in vessel property; buys vessel supplies; and pays the wages of the foreigners who officer and man the vessels. It is impossible to over-estimate the beneficial consequences to all of our people that would result from diverting even half of this large sum from foreign channels into our own avenues of manufacture and trade. Try to follow this $90,000,000 when retained in this country instead of going abroad. What becomes of it? It creates new ship building industries and affords new employment for capital and labor. It draws on the mines, forests and factories for their products needed in vessel construction and repair. It passes on through the capitalist and laborer, through the flouring and cotton mills supplying food and clothing to the miner, lumberman, mill hand, mechanic, etc., until it reaches the farms and cotton plantations, the foundations of all these varying industries. And does this $90,000,000 remain idle when it reaches the farmer and the cotton grower? Not at all. It commences again its life-giving journey back to the marts of trade to pay for the farmers' needs. It clothes the farmer; supplies his agricultural machinery; builds his fences, houses and barns; pays his mortgage principal and interest; and renders every other service for which money may be employed. And before the first year's $90,000,000 of saved national wealth has been well started on its beneficial mission, we will reach a second year with an additional $90,000,000 or more, and so it will grow and continue to grow. It means prosperity for our entire country, and because this must be the result we are justified in giving our best thought and energy in accomplishing the enactment of the wise national legislation so clearly necessary.

The account, thus far, may be summed up in a few words. The United States needs for the national defense and for the permanent prosperity of all our people to enact whatever legislation may be required to insure our having ship yards and merchant vessels built in these home yards to carry our flag in honorable competition with all others into every market of the world.

The few ship yards we now have in the United States, insignificant in number compared with those of other nations, are wholly supported by work upon naval vessels or vessels engaged in our own protected domestic or coastwise trade. We build, practically, no vessels for the foreign merchant service. The St. Paul and St. Louis were the first two modern trans-Atlantic steamers ever built in this country. They were built under the encouragement of United States government aid that proved insufficient to enable them to be operated with profit and no such vessels have since been built here.

We will assume it is decided that congress shall enact remedial legislation, and your question asks what shall it be and why? It should provide for supplementing by aid direct from the national treasury the efforts of individual citizens who may be induced to own and operate vessels in the foreign trade, so that it may be reasonably possible to earn a fair profit therefrom. Many years experience has proved this result to be impossible without government aid. The legislation should be straightforward and honest. It should be free from all trickery or effort, by indirection, to conceal from the people just what amount the United States treasury is called upon to pay. If the payment is made in the interest of the entire people it is right and there is no necessity for any concealment or misrepresentation as to the facts. The direct and honest way to meet this issue is in the payment of mileage compensation, calling it bounty, subsidy or what you will. This is the course that has been successfully pursued by the foreign nations whose competition we have to meet. It is the policy under which Japan is today creating a merchant marine that is absorbing the trade of the Pacific ocean. It is the policy under which Great Britain, Germany and France have created their merchant marines. It is a policy that has never failed except in instances where governments, while recognizing the wisdom of the policy, condemned it to failure from its inception by a narrow parsimony that made the government aid insufficient to make the desired result possible. Our own government, in enacting the legislation that brought the St. Paul and St. Louis into existence, reduced by one-third the rate of compensation experience had shown to be necessary to maintain and operate vessels of this class in the competitive ocean trade. The consequence has been that no further vessels of this class have been built and there is no indication that there ever will be.

There are many reasons, besides the governing one of our treaty relations to almost every foreign nation, why it is impossible to meet this issue with legislation contemplating discriminating duties on imports in foreign ships. This subject has been exhaustively considered, and even those who were previously the warmest advocates of a discriminating duty policy unite with other students of the question in agreeing that such a policy is, under existing conditions, practically impossible of enactment and enforcement.

There is only one policy that is practically possible and that is the payment of direct bounties for service performed. If any mistake is made it should be in making the amount of the bounty too large rather than too small. If too small it will fail to accomplish the desired result; if too large it will bring about the creation of vessels more rapidly than would otherwise be the case, with a resulting competition that will return to our people in reduced rates of freight any over payment made in amount of bounty.

In conclusion, it is well to remember that the United States wants its citizens to create a merchant marine and ship building industries that do not now exist and that cannot exist without governmental aid. These ships and ship yards are not called into existence for the purpose of benefitting any particular individuals. They are demanded in the interest of the national safety in time of war and of the greatest prosperity of all of our people in time of peace.

FRANK J. FIRTH.

Philadelphia, Pa., Sept. 9, 1899.

FROM A JUDGE OF THE UNITED STATES COURTS.

Editor Marine Review: I am pleased to learn that you are about to institute a crusade on behalf of our merchant marine. The first two questions of your circular I answer unhesitatingly in the affirmative. Regarding the third question, I am of the opinion that the assistance of congress is necessary, but in the absence of definite statistics I am not prepared to suggest the lines on which legislation should proceed. I feel confident that the American people will sanction any reasonable measure which will restore our commerce to the seas. Our national policy in all other branches of industry has been liberal, enlightened, progressive. The one conspicuous exception has been the treatment of our merchant marine. Here our policy has been parsimonious, shortsighted, retrogressive and unpatriotic. The time is opportune for the reform. With the tremendous impetus given to our inland and foreign commerce during the last decade this promising field should no longer be neglected. Although our products are now being sent to every land beneath the sun, we are compelled to rely for transportation almost wholly upon foreign nations—a condition which the patriot cannot contemplate without a feeling akin to shame. American goods should be carried in American ships. The movement has my cordial sympathy and I am confident that it will succeed.

ALFRED C. COXE.

District court of the United States, Chambers of Judge, Utica, N. Y., Sept. 8, 1899.

FROM THE FIRST ENGINEER-IN-CHIEF OF THE UNITED STATES NAVY.

Editor Marine Review: Laying aside all the requirements and arguments advanced in support of some effective action by congress, having in

view the creation and fostering of a merchant service, the education of sailors is an imperative necessity for the defense of our country and the maintenance of our commerce. CHARLES H. HASWELL.

New York, Sept. 9, 1899.

PROGRESS OF CONSTRUCTION—NAVAL VESSELS.

Rear Admiral Hichborn of the bureau of construction and repair, navy department, has just issued the regular monthly report showing the progress made on the naval vessels now under construction. Reports on the various craft are as follows:

				Degree of Completion.
	BATTLESHIPS.			
No. 5.	Kearsarge	16 knots.	Newport News Shipyard.	95 percent.
No. 6.	Kentucky	16 "	Newport News Shipyard.	92 "
No. 7.	Illinois	16 "	Newport News Shipyard.	70 "
No. 8.	Alabama	16 "	Cramp & Sons	90 "
No. 9.	Wisconsin	16 "	Union Iron Works	77 "
No. 10.	Maine	18 "	Cramp & Sons	12 "
No. 11.	Missouri	18 "	Newport News Shipyard.	1 "
No. 12.	Ohio	18 "	Union Iron Works	6 "
	SHEATHED CRUISER.			
	Albany	20 knots.	Armstrong's, England	85 percent.
	MONITORS.			
No. 7.	Arkansas	12 knots.	Newport News Shipyard.	2 percent.
No. 8.	Connecticut	12 "	Bath Iron Works	20 "
No. 9.	Florida	12 "	Lewis Nixon	14 "
No. 10.	Wyoming	12 "	Union Iron Works	22 "
	TORPEDO BOAT DESTROYERS.			
No. 1.	Bainbridge	29 knots.	Neafie & Levy	19 percent.
No. 2.	Barry	29 "	Neafie & Levy	18 "
No. 3.	Chauncey	29 "	Neafie & Levy	18 "
No. 4.	Dale	28 "	Wm. R. Trigg Co.	25 "
No. 5.	Decatur	28 "	Wm. R. Trigg Co.	25 "
No. 6.	Hopkins	29 "	Harlan & Hollingsworth.	24 "
No. 7.	Hull	29 "	Harlan & Hollingsworth.	24 "
No. 8.	Lawrence	30 "	Fore River Engine Co.	48 "
No. 9.	MacDonough	30 "	Fore River Engine Co.	45 "
No. 10.	Paul Jones	29 "	Union Iron Works	34 "
No. 11.	Perry	29 "	Union Iron Works	34 "
No. 12.	Preble	29 "	Union Iron Works	34 "
No. 13.	Stewart	29 "	Gas Engine & Power Co.	5 "
No. 14.	Truxtun	30 "	Maryland Steel Co.	5 "
No. 15.	Whipple	30 "	Maryland Steel Co.	5 "
No. 16.	Worden	30 "	Maryland Steel Co.	5 "
	TORPEDO BOATS.			
No. 9.	Dahlgren	30 knots.	Bath Iron Works	98 percent.
No. 10.	T. A. M. Craven	30 "	Bath Iron Works	97 "
No. 19.	Stringham	30 "	Harlan & Hollingsworth.	82 "
No. 20.	Goldsborough	30 "	Wolff & Zwicker	86 "
No. 21.	Bailey	30 "	Gas Engine & Power Co.	57 "
No. 24.	Bagley	28 "	Bath Iron Works	0 "
No. 25.	Barney	28 "	Bath Iron Works	0 "
No. 26.	Biddle	28 "	Bath Iron Works	0 "
No. 27.	Blakely	26 "	Geo. Lawley & Son	50 "
No. 28.	DeLong	26 "	Geo. Lawley & Son	50 "
No. 29.	Nicholson	26 "	Lewis Nixon	39 "
No. 30.	O'Brien	26 "	Lewis Nixon	39 "
No. 31.	Shubrick	26 "	Wm. R. Trigg Co.	55 "
No. 32.	Stockton	26 "	Wm. R. Trigg Co.	50 "
No. 33.	Thornton	26 "	Wm. R. Trigg Co.	49 "
No. 34.	Tingey	26 "	Columbian Iron Works.	34 "
No. 35.	Wilkes	26.5 "	Gas Engine & Power Co.	17 "
	SUBMARINE TORPEDO BOAT.			
No 1.	Plunger	8 knots.	Columbian Iron Works.	85 percent.

MAKE USE OF AUXILIARY STEERING APPARATUS.

Editor Marine Review: The recent calamity at Sailor's Encampment suggests an extremely simple method of avoiding such accidents. Every vessel carries an auxiliary steering apparatus for use in emergencies, entirely independent of the wheel chains, but when the emergency arises in a dangerous locality or in close quarters, the damage usually occurs before the auxiliary can be released and manned.

Suppose there had been a standing order on the Houghton, implicitly obeyed, that upon nearing such a place as the Encampment, where quick work is required, the auxiliary should be manned until the dangerous place is passed. The boat might have run fifty years without the emergency arising, but the precaution would have cost absolutely nothing, and in this one instance alone it would have saved thousands of dollars to the owners and upwards of a million dollars to the lake trade.

"Parting of wheel chains" is a standing bug-bear to all vessel captains, yet, of course, the break seldom occurs in a dangerous situation; of course, it is a matter of but a few moments before the auxiliary is in use; of course, it does not pay to go to all the trouble of preparing for emergencies which seldom arise and being laughed at as too easily scared; of course, these wheel chains cannot break. Admit all this, and then read the account of this disaster—a disaster the like of which could not occur anywhere else on the face of the globe, except in our lake channels with their vast tonnage and swift tortuous currents.

Vessel owners may well ask themselves: Which pays best, the precaution or the disaster?

WM. T. BLUNT,
U. S. Asst. Engineer.

Toledo, Sept. 9, 1899.

The North German Lloyd steamer Kaiser Wilhelm der Grosse again lowered all Atlantic records when she arrived in New York a few days ago. Her daily runs on the voyage were 411, 546, 546, 556, 538, and 452 knots, and the hourly average was 22.08 knots. The run was made in 5 days, 18 hours and 15 minutes.

TWENTY-FIVE MILLION TON MARK.

IT WILL PROBABLY BE REACHED IN LAKE SUPERIOR COMMERCE FOR THE FULL SEASON, NOTWITHSTANDING A LOSS OF ABOUT HALF A MILLION TONS ON ACCOUNT OF THE BLOCKADE.

Practically four million tons (3,984,602) of freight was moved through the two canals, Canadian and United States, at the Sault during the month of August, and the total to Sept. 1 this year is 14,418,477 net tons against 12,613,639 tons on the same date in 1898. This means that the twenty-five million mark in Lake Superior commence will very probably be reached in the present season, notwithstanding the loss of probably half a million tons due to the sinking of the Rockefeller steamer Houghton in the St. Marys river last week. In 1898 the total for the full season was 21,234,664 net tons, which was largely in excess of any previous year.

Although iron ore has contributed more than a million net tons to the increase this year, the most noticeable gain is in wheat, the shipments of that cereal, eastbound, to Sept. 1 of this year aggregating 24,825,894 bushels, against 11,514,527 bushels on the same date a year ago. In grain other than wheat the shipments thus far this year foot up 16,229,883 bushels, against 14,104,367 bushels on Sept. 1, 1898. The anthracite coal shippers have moved to Lake Superior 507,703 tons and are evidently well up to requirements, as the hard coal shipments at this time a year ago amounted to only 277,131 tons, but there is still quite a large shortage in soft coal; the figures for the latter to Sept. 1 of this year are 1,810,969 tons compared with 2,139,778 tons on Sept. 1, 1898. A full summary of the canal reports follows:

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To Sept. 1, 1899.	To Sept. 1, 1898.	To Sept. 1, 1897.
Coal, anthracite, net tons	507,703	277,131	296.183
Coal, bituminous, net tons	1,810,969	2,139,778	1,015,627
Iron ore, net tons	9,062,580	7,714,0 3	6,689,269
Wheat, bushels	24,825,894	11,514,527	22,730.621
Flour, barrels	3,705,457	3,503,875	4,573,061

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO SEPT. 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.

ITEMS.	Designation.	To Sept. 1, 1899.	To Sept. 1, 1898.	To Sept. 1, 1897.
Copper	Net tons	63,859	75,567	79,322
Grain, other than wheat	Bushels	16,229,883	14,104,367	12,763.415
Building stone	Net tons	17,778	4,063	2,894
Flour	Barrels	3,704,107	3,502,973	4,572,811
Iron ore	Net tons	9,062,580	7,714,053	6,689,269
Iron, pig	Net tons	15,926	20,215	5,514
Lumber	M. ft. b. m.	588,747	520,725	468,537
Silver ore	Net tons	.....	.....	5
Wheat	Bushels	24,825,894	11,514,527	22,730,621
Unclassified freight	Net tons	87,437	145,097	159,779
Passengers	Number	18,408	15,316	14,748

WEST BOUND.

Coal, anthracite	Net tons	507,703	277,131	296,183
Coal, bituminous	Net tons	1,810,969	2,139,778	1,015,627
Flour	Barrels	1,350	902	250
Grain	Bushels	26,500	7,715	.....
Manufactured iron	Net tons	98,662	149,982	70,147
Salt	Barrels	189,932	178,365	145,398
Unclassified freight	Net tons	239,566	228,521	217,6 0
Passengers	Number	20,060	18,522	16,793

SUMMARY OF TOTAL FREIGHT MOVEMENT IN TONS.

	To Sept. 1, 1899.	To Sept. 1, 1898.	To Sept. 1, 1897.
West bound freight of all kinds, net tons	2,686,443	2,823,396	1,628,699
East bound freight of all kinds, net tons	11,732,034	9,790,243	9,176,305
	14,418,477	12,613,639	10,805,004

	Vessel passages.	Registered tons.
To Sept. 1, 1899	11,856	12,673,275
To Sept. 1, 1898	11,029	11,105,554
To Sept. 1, 1897	10,634	10,697,153

Among Philadelphia firms that have been allotted space at the national export exposition, which will open in that city about the middle of the month, are the Otto Gas Engine Works, William S. Haines Co., Ajax Metal Co., A. & P. Roberts Co. (Pencoyd Iron Works), Merchant & Co., and the Keystone Drop Forge Co. It is understood that the Carnegie Steel Co., Limited, of Pittsburg, will have one of the finest exhibits in the display.

MARINE REVIEW

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Mr. Jesse Spalding, lumber dealer and vessel owner of Chicago, is of the opinion that the Lake Carriers' Association should take some action with a view to regulating the management of big tows in the St. Mary's river. Mr. Spalding is a member of the board of managers of the association, and immediately following the release of the steamer Houghton he addressed a communication on this subject to the executive officers. It will be given consideration at the next meeting of the executive committee. Mr. Spalding suggests that possibly a tug behind each of the big barges working down the river might help to prevent accidents of the Houghton kind, but it would seem that the power of a tug holding onto the Houghton's tow would have been of very little account. If her stern anchors could have been used they would have counted for more than two or three tugs.

Representative George Edmund Foss of Chicago has returned from a trip to Europe where he spent his entire time in investigating naval affairs of England, Germany, Italy and France. Mr. Foss is a member of the naval committee of the house of representatives, and he states that he will spend all his time between now and the assembling of congress in formulating legislation affecting the navy. After a recent conference with President McKinley he predicted that there will be much naval legislation in the next congress, in view of the fact that it is the intention of the president to give the United States the finest naval force of its size in the world. Mr. Foss is certain that the matter of dry docks authorized by the last congress will be reconsidered and stone docks authorized in place of the timber structures for which appropriations were made.

At Marquette, Mich., a few days ago, Lieut. Charles W. McLellan, assistant inspector of the life saving service, witnessed trials of a life boat fitted with power. An ordinary 35-foot life boat was fitted with a 12-horse power Superior gas engine, manufactured by the Lake Shore Iron Works of Marquette. Under full power the boat made more than 7 miles per hour. During the drill of the life savers the boat was rolled over and over and it was proven that the presence of the engine in the air-tight chamber in no way affected the ability of the boat to right itself. The engine continued to run regardless of the position of the craft.

Rear Admiral Bradford, chief of the navy bureau of equipment, has information that Signor Marconi, the inventor of wireless telegraphy, will, upon his arrival in this country, a few weeks hence, proceed to Washington to discuss with him proposed experiments with the wireless system of communication in the navy. The inventor will bring with him a complete wireless telegraphy equipment, and Admiral Bradford will recommend that one of the vessels of the navy be set aside for experimental work. It is proposed to place the receiver on shore, and the warship will communicate with it from varying distances.

It now looks as if there was a possibility that the United States navy department might not, after all, secure the Spanish floating dry dock at Havana. The United States government will not increase its bid of $285,000 and there has been no other bidder, yet for some inexplainable reason the sale is postponed from time to time. It is rumored that the Spanish government is desirous that the United States should not secure possession of the dock, for fear it might be used in an official exposition of the real cause of the explosion which destroyed the Maine.

A rather remarkable feat was performed a few days since at the Erie basin, Brooklyn, N. Y. The Old Dominion liner Richmond was on the large balance dry dock receiving a general overhauling, and it being desired to transfer the vessel to that portion of the basin owned by the John N. Robins Co., the dock with the vessel was towed the full distance of half a mile by four powerful tugs. During the moving of the vessel a force of 150 boilermakers, ship fitters and carpenters continued at work with no loss of time.

The quartermaster's department of the United States army has just chartered three more vessels for use as transports. They are the Westminster, Benmohr and Lenox and they will be used for the transportation to Manila of draft mules. Maj. Long, superintendent of transportation at San Francisco, has been instructed by the department to secure two additional vessels for use as troop ships. The Roanoke is now under consideration for charter and will in all likelihood be accepted.

The steamer Britannic of the White Star line has completed her service as a mail steamer. The Oceanic replaces her. When the Britannic was built by Harland & Wolff of Belfast, Ireland, a quarter of a century ago, she marked the beginning of a new era in transatlantic navigation. Not only has the Britannic never once been laid up on account of an accident, but the vessel actually makes better time on her passages today than she did twenty-five years ago.

Fully 300 men are now employed in erecting the works of the New York Ship Building Co. at Camden, N. J. Operations in some parts of the new works have been suspended by reason of the difficulty in securing concrete. Three pile drivers are now at work on the water front.

NOT PROSPERITY OF A DAY.

We have referred to the plans for lake vessel building that have been laid aside recently because of the high prices of material. Ore-carrying vessels of 6,000 gross tons capacity and over that could have been built last year for $210,000, would cost $300,000 today. The difference seems like a large amount upon which to earn interest in unremunerative seasons. Yet on the basis of calculations vessel men are already making for next season it is not difficult to see that the increment of cost could be easily earned in two years, over and above the profit possible to 6,000-ton boats from a low-level freight like 60 cents from the head of the lake. It is not improbable that the Duluth rate of next year will give an additional profit of 40 cents a ton the season through. That at least would be expected if the price of ore goes $1.50 beyond the 1899 basis. Counting 20 trips and 6,000 tons to the cargo, would mean $48,000 profit for the season over and above the profit yielded by season contracts at 60 cents from the head of the lake. Two such seasons would bring the cost of the $300,000 boat down to $204,000, which is certainly a basis from which to figure remunerative earnings in good times and bad. We have made no allowance in the above for increased vessel expenses and higher dock charges; but the estimated freight rate is probably ultra-conservative in view of the lake traffic to be handled next year and the tonnage available for handling it.

The above calculation illustrates how high prices of material are a seeming prohibition to investment calling for iron and steel, and yet should not prove a real barrier when the compensations to the investor, coming from the very conditions that have made iron and steel prices high, are considered. Prosperity does not give large profits to a producer in a given line without increasing also the purchasing power of the consumer. And where the farmer is getting good returns from more than average crops, as is the case today, and has put away beside the surplus of three preceding years of good prices, there is furnished for the iron and steel manufacturers and for manufacturers in every line a substantial foundation for a period of prosperity that does not begin and end in a single year. This condition has not been sufficiently recognized in the thinking of those who have been watching week by week for the consumption of iron to drop off because of high prices.

Nor will the momentum of the greater purchasing power of the country's wage earners in manufacturing and mining industries be quickly lost. It has been gathering strength month by month. Savings bank deposits in the past two years have reflected the magnificent increase in the total wage of the country. Theoretically, advancing prices mean curtailed consumption; but the theory applies to advances in prices with no accompanying increase in purchasing power. After a period of starveling consumption the country is now compensating for lost time by supplying legitimate needs, and more than that, by expanding its facilities to care for the ordinary demands of a population largely augmented since the last period of prosperity and having nearly a decade's growth of new needs. For nothing is truer than that as the world grows older the list of necessities of the average man is constantly recruited from the old list of his luxuries.

We believe, too, that the influence of the large consolidations in holding up prices and therefore maintaining wages has not been duly allowed for by those who expect a comparatively speedy reaction. Thus far the consolidations in the iron trade have not made any show of their workings under conditions calling for an exercise of their new power. Prices have been fixed by demand largely exceeding supply. That rapid and serious recessions will not be permitted, so far as the power of the consolidations can prevent it, is practically certain.—Iron Trade Review.

THEORETICAL NAVAL ARCHITECTURE.

One of the most valuable technical works of a ship building kind published this year is the "Text Book of Theoretical Naval Architecture," which has just come from press. The author, E. L. Attwood, is an assistant constructor in the British navy and lecturer on naval architecture at the West Ham municipal technical institute. The book is designed to provide students and draughtsmen engaged in ship builders' and naval architects' drawing offices with a text book that explains calculations that continually have to be performed. It is intended, also, that the work, and more especially its later portions, shall serve as a text book for the theoretical portion of the examinations of the science and art department in naval architecture. A special feature of the book is the large number of examples given in the text and at the ends of the chapters. By means of these examples the student is able to test his grasp of the principles and processes given in the text. Many of the examples have been taken from actual drawing-office calculations and constitute a most valuable summary. The book is illustrated with 114 diagrams.

The work is published by Longmans, Green & Co. of 91 and 93 Fifth avenue, New York City.

A new detachable telephone for the use of divers, which is said to be a vast improvement over anything hitherto available, has just been placed on the market by A. Schrader's Son of New York City. The telephones heretofore employed have always been attached to the diver's helmet, and this, it is claimed, has frequently been a source of either inconvenience or annoyance. The new device can be attached to any armor and as readily detached. Moreover no special mouthpiece for the diver is required. He simply talks in an ordinary tone in his helmet, which, being a sounding bell in itself, conveys the vibration of his tones through the wire as clearly as if it were a speaking tube.

Mr. Horace See of No. 1 Broadway, New York City, whose hydropneumatic ash ejector and other specialties have attained a reputation very nearly world-wide in scope, has just issued a very handsome little booklet entitled "Some Sea Specialties," which is embellished with very handsome illustrations of the royal yachts Hohenzollern, Standart and Victoria and Albert, as well as the steamer Oceanic, the United States hospital ship Solace, several of the auxiliary cruisers and a large number of modern war vessels of the leading maritime powers. The cover is handsomely illuminated.

SHIP YARD IMPROVEMENTS AT DETROIT.

Detroit, Mich., Sept. 13.—The American Ship Building Co. has evidently decided that its works here and at Wyandotte, operated by the Detroit Ship Building Co., of which Alexander McVittie is presient and C. B. Calder general superintendent, shall be kept in the first rank among the different plants of the lakes. Improvements under way at Wyandotte include a compound air compressor, a duplicate of the one at Chicago, and which will have a capacity of 3,000 cubic feet of free air compressed to 80 pounds. This means air hoists at tools and a general use of pneumatic machinery. The capacity of the company's boiler works is to be doubled. At Wyandotte will be erected also a traveling crane that was in use at the Wheeler works (the new one), and which will cover the berths for two 500-foot ships. In order to secure the required additional length for the crane and the 500-foot ships, the dock between the north and south slips is being extended 70 feet.

The steamer W. B. Morley, which was in collision with the car ferry Lansdown, will be fully repaired and get away from Detroit this week. Alterations in the car ferry Huron will soon be well along towards completion. She is getting new steel decks and new houses and her bow is being changed to fit the Detroit and Windsor slips. This vessel, which was in use between Port Huron and Sarnia before the tunnel was built at that point, will now be used as a spare ferry here.

The steamer Angeline, a 6,000-ton ore carrier that is building for interests represented in the office of W. G. Mather of Cleveland, will be ready for service about Oct. 10. Steam will be made in her boilers next week.

The one other improvement that is desired at these works, and which will certainly come a little later on, is a dry dock of 550 feet length. A big dry dock was under consideration by the old company before the ship yards were consolidated. It is badly needed, as the present docks have been crowded since last fall.

STEAMER GOVERNOR DINGLEY.

The steamer Governor Dingley, building for the Portland Steamship Co., was successfully launched at the Roach Ship Yard, Chester, Pa., a few days ago. The Dingley is a steel vessel 320 feet in length, 50 feet beam, 20 feet depth from base line to top of freight deck beams and 9 feet depth between decks. The quarter deck, or social hall, is finished in mahogany with rubber tiling floor. On this deck also are the coat and wash rooms, barber shop, toilet rooms and purser's office. Aft the social hall on the main deck is a spacious dining room, with a ladies' cabin aft. There are two saloon decks on which are staterooms. The steamer has a total of 220 state rooms and each room has an outside window. Electric light and electric bell systems are fitted throughout the vessel.

The Dingley is fitted with a triple expansion engine with cylinders of 27½, 42½ and 70 inches diameter, and 33 inches stroke. The guaranteed speed of the boat is 16 knots. The steamer has sixteen bulkheads and above the main deck the frames and steel plating are carried to the saloon deck, the saloons being supported by web frames and steel beams securely riveted at the sides of the vessel to a deck stringer supported by channel ridge bars, back to back, with 5-inch stanchions every 8 feet. The vessel is furnished with ten metallic life boats and five life rafts of the largest size. Boilers for this steamer were furnished by the W. & A. Fletcher Co. of Hoboken, N. J., the steam steering gear is of the Williamson type and the windlass was manufactured by the Hyde Windlass Co. of Bath, Me. The vessel was built under the rules of the United States Standard Register and classed to their highest rating.

ANOTHER LARGE MINE FOR THE CARNEGIE INTEREST.

The deal by which the Oliver Iron Mining Co. acquires the Aurora mine, on the Gogebic range, is understood to have been concluded this week; and in this step the Carnegie-Oliver mining interest further establishes its position as the leading miner of Lake Superior ores. The Aurora ore is familiar to furnacemen, having been regarded for years as the choicest product of the Gogebic range. The mine is one of the Ironwood group and its purchase by the Oliver Iron Mining Co. gives the latter four properties in line, beginning with the Norrie and taking in turn to the eastward the East Norrie, Aurora and Pabst. Still farther east, in the Bessemer district, it has the Tilden mine. These properties produced 1,344,269 tons last year, but they could probably produce under extensive development and full operation from 1¾ to 2 millions a year. The Aurora was one of the Penokee & Gogebic Development Co. properties, but was operated in recent years, under reorganization, by the Aurora Iron Mining Co. Its shipments to the end of last year were 2,403,190 tons. The average analysis of last year's cargoes was 61.34 in iron, .028 in phosphorus, 6.72 in silica and 9.77 in moisture. The most important work at the Aurora in recent years was the sinking of a new shaft, which was designed to secure the ore in the western portion of the mine. As at the Norrie the Aurora has considerable deposits under the dyke, which will make it a producer of good annual tonnages for a considerable period. It is understood that the new deal is a purchase of the stock of the Aurora Iron Mining Co. which has a lease of the mine. —Iron Trade Review.

SHIP BUILDING ON THE DELAWARE.

Ship building on the Delaware river has seldom if ever been in a more prosperous condition than at present. There are now under construction in the yards along the river a total of more than fifty vessels, valued in the aggregate at over $30,000,000. In the construction of these vessels upward of 12,000 men are employed. The vessels include three battleships, one cruiser, six torpedo boat destroyers, two yachts, five tugs and twenty-one steamers. The largest of the latter is the 400-foot steamer building at the Cramp yard for the Plant line. The craft are distributed as follows: Cramp & Sons Co., twelve; Harlan & Hollingsworth Co., ten; Jackson & Sharp Co., nine; Neafie & Levy, eight; Roach Ship Yard, four; Morris & Mathias, three; Pusey & Jones, two; Dialogue & Son, one; Moore's, one.

ANOTHER CONTRACT FOR THE ROACH YARD.

The Roach Ship Yard at Chester, Pa., has just closed a contract for a third steamer for the American-Hawaiian Steamship Co. It will be remembered that the firm mentioned some months ago contracted with the Union Iron Works of San Francisco for one, and with the Roach Ship Yard for two, immense freight and passenger-carrying steamers, each of which will almost equal in size the American liners St. Louis and St. Paul. A contract has now been closed with the Roach firm to duplicate one of the vessels, making a total of three which they will have building for this steamship company at one time. The new steamer, which will be laid down in the berth recently vacated by the steamer Atlas, building for the Standard Oil Co., will be 430 feet in length, of 10,000 gross tons register, and will be capable of carrying 8,000 tons of freight and 2,500 tons of coal. The two vessels now building at Chester will be completed next summer, but the contract just entered into does not call for the delivery of the third liner, just contracted for, until March, 1901. Contracts have already been closed for the material for this new boat. The Worth Brothers Rolling Mill of Coatesville, Pa., will furnish the plates and the Pencoyd Iron Works the frames.

TOWBOAT FOR RIVER SERVICE.

Capt. E. J. Howard is just completing at his ship yard at Jeffersonville, Ind., a very handsome towboat for the use of the Mississippi river commission. The W. R. King, as the vessel will be christened, will be steel-braced throughout. The machinery equipment is especially modern. The engine room itself is 57 feet long by 38 feet wide. The engines have cylinders 24 inches in diameter and 10 feet stroke, and steam is supplied to them from six four-flued diamond steel boilers, 42 inches in diameter and 24 feet in length. The vessel's shaft is 14 inches in diameter and 32 feet long and weighs with the crank and flanges 47,000 pounds. The vessel is fitted with electric light plant, steam steering gear and modern auxiliaries of every description.

The keel will be laid at the Howard yard in a few days for another steamer for the Lee line. She will be 190 feet long, 38 feet beam and 5½ feet depth of hull. There has also been launched at Jeffersonville within a short time the first of the four large steel barges building for the Huntington Transportation Co. The other three will follow at intervals of a week.

CONVERTED YACHTS AS WAR VESSELS.

Within a few weeks about a dozen of the former yachts and seagoing tugs which were converted into gunboats during the war with Spain will be ready for service once more. The vessels have been out of commission for some time, and during the interval, in addition to being refitted, have undergone extensive alterations. Two or three of these craft will at once be sent to South American waters, it being the intention of the navy department to henceforth keep a small squadron of light-draught armed vessels in Central American waters to look out for American interests. Heretofore it has been difficult to protect the interests of our citizens in the locality mentioned, simply because of the lack of light-draught naval vessels capable of entering shallow lagoons and rivers. A majority of the remainder of the vessels will be utilized in the work of making a survey of the coasts of Cuba and Porto Rico. None of them will be sent to the Philippines. The armament of the vessels will be practically uniform, each having several 6-pounders, 3-pounders and Gatlings.

EXHIBIT OF COMPRESSED AIR TOOLS.

At the National Export Exposition, which opens in Philadelphia on the 14th inst., the Chicago Pneumatic Tool Co. is installing an exhibit of compressed air tools. There will be shown at this exhibit the new Boyer long-stroke hammer, for driving rivets from ¾ to 1¼ inches in diameter, new reversible wood boring machines, the Henrikson flue cutter with reversible motor, the well-known Boyer drills, and Boyer hammers for chipping and calking; also the Haeseler piston drills, Phoenix rotary drills and other pneumatic appliances, making a very full and complete exhibit of this line. The Chicago company is also placing at the exposition an electric-driven air compressor for operating the tools, so that they will be enabled to give practical demonstration of the working of the tools for the benefit of foreigners attending the exposition, and others interested in this line. This exhibit will be in charge of a practical man and the endeavor will be to make it of great interest in every particular.

Shipping and ship buildings interests will receive no small degree of consideration at the international commercial congress, to be held in connection with the national export exposition at Philadelphia in October, and to which thirty-two governments have accepted the invitation to send delegates. Among the topics assigned for discussion are the following: "The Revival of the American Merchant Marine," "Navigation Laws and Domestic Shipping," "Steamship Subsidies as a Factor in the Development of Trade," "Sea Power and its Influence on Foreign Trade," "The Advantages to all Nations of an Isthmian Canal," and a host of commercial topics which will bear indirectly upon navigation interests.

The board appointed to examine into the causes of the grounding of the United States cable ship Hooker, which recently went ashore near Corregidor island, at the entrance to Manila bay, has found that the accident occurred in daylight on a reef shown on the chart and that there are evidences of carelessness on the part of the navigator of the vessel. The cable instruments and other property have been removed from the Hooker and the cable is now being removed. The hull of the vessel has been badly torn by the coral reef but there are still hopes of getting her off.

The fear is expressed that owing to existing conditions in the steel industry no ship builders will be able to submit bids for the new cruisers of the Denver class on Nov. 1, which will be within the limit fixed by law. The board of construction of the navy department is fearful lest certain modifications will have to be made in the designs of the vessels in question.

IMPROVEMENT OF THE ERIE CANAL

Buffalo, Sept. 13.—In the Review of last week I find an extract from a letter by C. V. R. Ludington of Monticello, N. Y., in severe opposition to the improvement of the canal. The writer is credited with considerable literature in the same vein, but if he has no argument that will hold water better than will the extract it is high time that he retires from the field, as his "reasons" all tell on the side of the canal.

Let us sift them a trifle. The extract begins by saying: "Had Clinton projected either of the railroad lines now existing between New York and Buffalo twenty years before the canal was built, neither the Erie canal nor any other state canal would ever have been built." Quite possibly, but that would have been a feat more prodigious than Munchausen ever dreamed of, for at that date railroads were unknown. The Erie canal was begun in 1817 and finished in 1825. Twenty years previous to 1817 found Stephenson, the inventor of the railroad, only sixteen years old. It was 1851, the year that the Erie railroad was finished to Dunkirk, that through railroading began, and the New York Central railroad was not formed out of the pieces that had been built from time to time between Albany and Buffalo till 1853.

The writer "believes that no parallel instance to the contrary can be found." Has he never heard of the Manchester (Eng.) ship-canal, that parallels a previously-built railroad?

Then follows a long argument to show that canals are not of as general utility as railroads. Nobody disputes this. Unless a canal can show a special reason for existence it is of no particular value and soon gives way to the railroads. The Erie canal has a special value, as a supplement to the roads and not an opponent. It can be made a cheaper mode of conveyance, by reason of the peculiarities of the traffic available to it, than the roads can ever become.

"What have our canals done, unaided by railroads?" again inquires the writer. Everybody but him knows that they made the Empire State before railroad influence was felt and that it is to save the state from railroad deals and discriminations that we now seek to maintain the canals.

"Look at the cordon of cities on trunk lines and find if any canal ever built up such a showing," he says. The writer is again the only person extant who has failed to note the line of cities that sprang up along the Erie canal before railroad days. For three quarters of a century there has been nothing like them. It is true that for a time the railroads did foster the growth of eastern towns, but they are not doing so now. The New York Central and Erie railroads tried to follow the line of the cities, but the newer lines—West Shore, Lackawanna and Lehigh—were built to get a share of the through business and avoided the towns. Today I have received quotations from wheat dealers, who are obliged to cut the price of state wheat 2 cents below that of western wheat of poorer quality, on account of the rail discrimination against state products. The roads have ceased to promote eastern interests. What is to do this if the canal cannot be saved?

But the crowning evidence of a lack of knowledge of the subject is in the last paragraph quoted: "Why don't the canal advocates give us full statistics respecting our canals, and their tonnage, past and present, whether increasing or otherwise, the cost of administration" and so on? Really, what have the canal advocates been doing right along but just this? When the state canal committee prepared for its series of hearings this year it sent out on May 1 a circular letter asking responses as to the advisability of enlarging the canal. This letter should have gone into Mr. Ludington's hands, but as it may not have done so I quote from it: "From 1817 to the end of 1882, when the tolls on the canals were abolished, the state had paid out for construction or enlargement of the canals the sum of $78,685,580, and for superintendence and ordinary repairs the sum of $48,399,286, and had received in tolls and other revenues the sum of $135,418,325, leaving a net balance of income over outgo of $8,333,457. The profit on the Erie canal at that time was more than $42,000,000 over and above the cost of construction and maintenance, in addition to the indisputable benefits in the past to the commerce of the state of New York. Since the tolls were abolished in 1882 the average annual cost of operation, repairs and maintenance (excluding interest charges) has been about $1,034,000, of which $802,000 has been paid from the ordinary repair fund and $232,000 from the extraordinary repair fund."

Could Mr. Ludington's questions have been answered more distinctly or publicly? From the above it will be seen that the ordinary cost of maintaining the canals is a matter of about 13 cents each to the people of the state in a year. It might be added that if the interest merely on the profit the state has made out of the canals had been used to keep it abreast of the rail improvements we would not be asking today whether it is any longer worth maintaining. JOHN CHAMBERLIN.

CARNEGIE RAILWAY IN MINNESOTA.

Virginia & Erie Railway Co. is the name selected for the Carnegie-Oliver corporation long talked of in conection with plans for a new ore road in Minnesota. In the articles of incorporation, filed recently, the capital is placed at $1,000,000 and the incorporators are Henry W. Oliver of Pittsburg, C. W. Baker, New York sales agent of the Carnegie Steel Co., Ltd., George T. Oliver, H. M. Curry, James Gayley, D. M. Clemson, Charles D. Fraser of Pittsburg, and C. A Congdon of Duluth, the latter attorney for the Oliver-Carnegie interests in Minnesota The general statement concerning the new road is that it will run from Virginia to Ely and thence in an easterly or southerly direction to a point in Lake or Cook county, presumably to some harbor on Lake Superior. The personnel of the incorporators indicates that the road is to be built to haul ore of the Oliver Iron Mining Co. Whether the outcome of the incorporation will be a reduction of rates by the existing ore roads or the actual building of the new line time will develop. On the Gogebic range, the discussion of the possibility of a new and more direct line to Lake Superior to haul the ore of the Oliver interest led to a reduction in rates.

Under orders from the navy department, Rear Admiral Sampson recently visited a number of localities on the New England coast with a view to selecting a site for a coaling station, and it now seems likely that a station will be established near Frenchman's bay on the Maine coast.

VESSEL SPEED IN THE FUTURE.

Mr. Joseph R. Oldham, a writer upon marine subjects, who is known to readers of the Review, contributes to the current number of Cassier's Magazine an article entitled "Untrammeled Ship Building and Marine Engineering Development—Probabilities of the Future." In discussing the subject of future steam speeds at sea Mr. Oldham says:

"As to the speed of the future, I remember reading an article on mechanical impossibilities written about twenty-five years ago. It was well written and possibly it was generally correct, but one operation, which was cited as impossible of accomplishment, was that of propelling a steamer at the rate of 25 miles an hour across the ocean. At that time the Atlantic had never been crossed by a screw steamer at so high a rate as 15 miles an hour, the Scotia being the fastest liner in those days, she having crossed the Atlantic at an average rate of 14 1-3 knots. Steaming across the ocean at the rate of 25 miles an hour might, therefore, well have been looked upon at that date as impossible, but, today there are steamers which have reached that speed, and there are others in course of construction which may probably exceed that rate across the Atlantic.

"Although, roughly speaking, the power required to propel a steamer varies with the cube of the speed, yet, before a third of the next century expires, another increase of at lease 50 per cent. in ocean speed may safely be prophesied. How this is to be accomplished, it would be too hazardous to attempt to surmise; but I may point out how I think it will not be done, and that is by carrying and handling 500 tons of bunker coals in a hull drawing nearly 50 feet of water. The model of the ocean mail steamer of the next century will probably be that of a very much enlarged 'destroyer' of great breadth and length and small draught of water forward. Lighter and stronger materials will compose the structure, which may be moved by multiple propellers, possibly working in a tunnel, so that a number of wheels could be worked by separate shafts, actuated by rotary motors, as the sizes of screw shafts and engines even now under construction are perilously large; or the motive power may be produced by compressed air or gas. Then, the form of least resistance probably being discovered, the hull, broad and light in comparison with the augmented dimensions, will rise on top of the waves rather than pass through them. The rolling and pitching may be more severe than at present, but with improved cabins and a shortened voyage, the difference may not be noticed. The construction of a steamer of 65,000 tons will probably not trouble the constructors of the future nearly as much as did the building of the Great Eastern those of the past. There will be infinitely less labor, both mental and physical, than was required for the construction of a great ship in those days."

NAVAL STATION AT CAVITE.

According to recent reports from the Philippines the United States naval authorities have a task of decidedly large proportions on their hands in the effort to transform the naval station at Cavite into a plant adequate for repair work of any magnitude. The location of the naval station upon a peninsula is in many respects ideal, but the buildings are old and in no way suited to a modern engineering establishment. The machine and blacksmith shops and power house are in a single building partitioned with heavy stone walls. The boilers are old-fashioned affairs of the Lancashire type, the furnaces running their full length. The furnaces have Galloway tubes and the steam pressure is in the neighborhood of 20 pounds. The machine shop engine is a relic of the vertical, direct-acting, single inverted type, with feed pump atached, worked by an eccentric and with the slide valve worked by a second crank.

The machinery throughout the plant is old, heavy and without exception in poor condition. The centers of the lathes wobble, the shapers are old fashioned and the entire equipment includes but a single gap lathe. The blacksmith shop has modern forges, but none of them are very large. The blower is run by belting from the machine shop, the large steam hammer is valueless and there are no facilities for heavy forging. The boiler shop, which is a mere shed, is equipped with five forges and two shearing and punching machines. Power is furnished by a small horizontal engine, to which steam is furnished from a Cornish boiler. The foundry contains three brass furnaces and three cupolas (all of which need rebuilding), a small engine and a blower. The pattern shop is primative. The marine ways are ordinary affairs, a wooden bed sliding on rollers between wooden guides. The ways are moved by a large winch. The large ones are 175 feet in length and 15 feet beam, while the small ones are not over 100 feet long. On the sea wall is a shears capable of lifting 25 tons and a crane with a capacity of 3 or 4 tons. The only modern feature of the yard is the ship building shop, which has a fair equipment of modern machinery, to which power is supplied by two large horizontal engines. Despite the meagre facilities, a large amount of work for the American fleet has been done in this yard.

COMMITTEE ON MERCHANT MARINE.

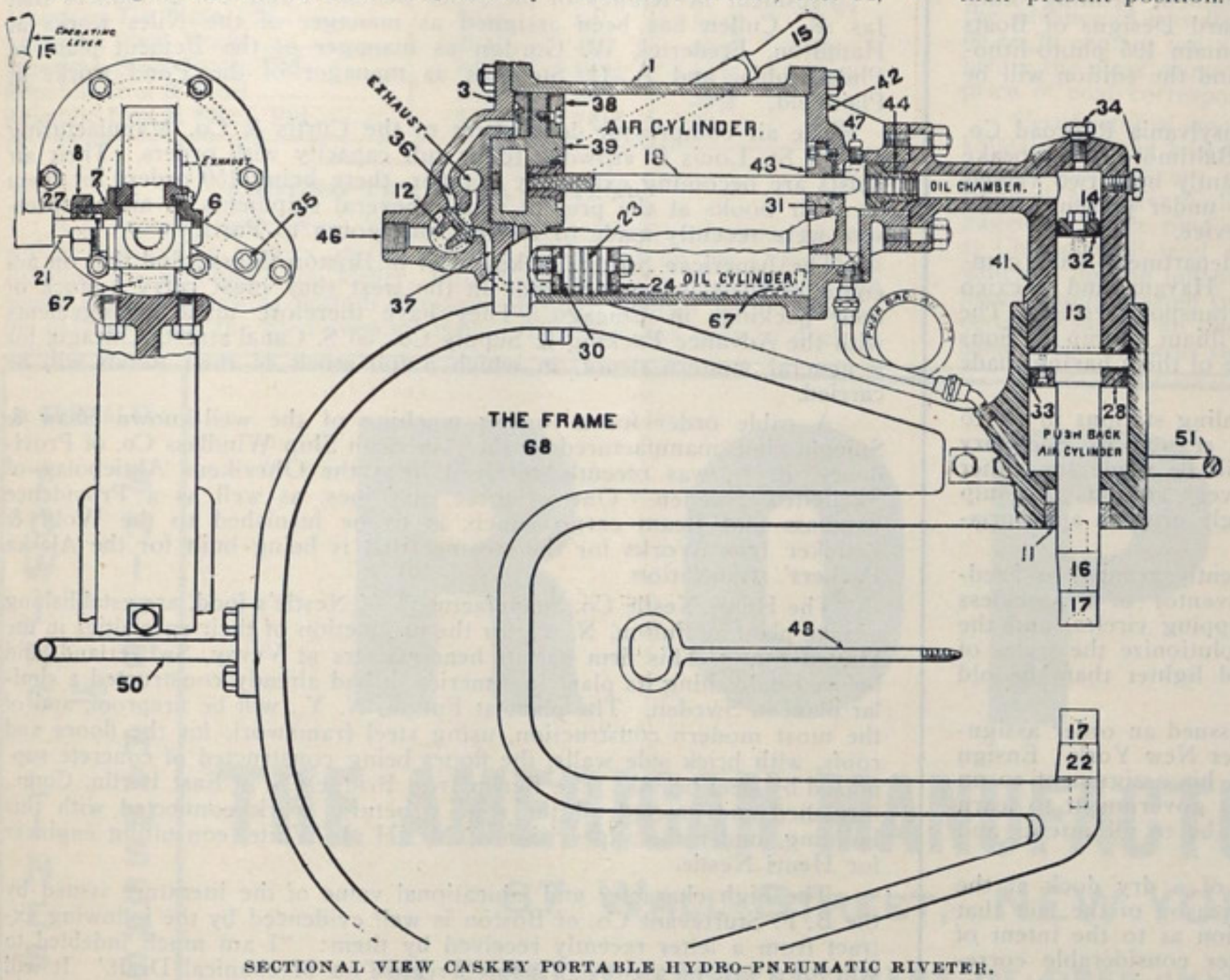
The committee on merchant marine and fisheries in the next house of representatives will undoubtedly be accorded a higher place in the scale of relative importance than has ever before fallen to that body. Sereno E. Payne of New York is chairman of the committee and is likely to remain so. Something of the estimate placed on the position may be imagined from the authoritative announcement that if the chairmanship of so important a committee and a place on the ways and means committee is deemed to present too many duties to be attended to by one man, Mr. Payne will retire from the committee on ways and means. The reason of the great demand for places on the committee on merchant marine is found, of course, in the fact that the subsidy bill is certain to come up during the session and with the present sentiment and influence in its favor there are decided hopes of its passage.

The cruiser Boston will be placed out of commission preparatory to being refitted immediately upon her arrival at the Mare island navy yard, California, from Manila. It is expected that fully nine months will be required to put the vessel in thorough condition. Among the important changes to be made will be the substitution of rapid-fire guns for the antiquated battery which the vessel has heretofore carried.

CASKEY PORTABLE HYDRO-PNEUMATIC RIVETER.

The engraving shows a sectional view of a new style portable riveter manufactured by Pedrick & Ayer, Philadelphia, Pa., and which is especially adapted for ship yards and structural iron works, and for the use of boiler makers and bridge builders. The Caskey portable hydro-pneumatic riveter is designed for using compressed air as a prime mover, with the hydro-carbon fluid used in the oil chambers and oil cylinders. This admits of the machine being operated in very cold weather and in open places with no liability of freezing and causing trouble, as is the case with riveters of hydraulic construction, and is an important feature.

The engraving is largely self-explanatory. The main frame, No. 64,



SECTIONAL VIEW CASKEY PORTABLE HYDRO-PNEUMATIC RIVETER.

is a steel casting, and can be made in any desired shape, adapted to the conditions and positions in which the riveter is to work. The oil chamber and pressure cylinder, No. 41, is made from nickel steel forging and accurately machined. The dolly bar, or hydraulic piston, No. 13, is manufactured of the best tool steel, accurately machined, hardened and ground; No. 42 inside cylinder head is of cast steel.

This riveter is built for very hard usage, and the least liability of breakage. There are but four moving parts, and the operating lever, No. 15, is the only moving part exposed. All packings are easy of examination. The construction of the machine secures the maximum pressure on a rivet with as little weight in the machine as is possible. It works rapidly without shock or jar, is easy to handle and gives a uniform pressure on every rivet. No blow is given when using this machine and therefore no crystallization takes place upon the rivet when being driven.

The riveter is suspended by a bale, which allows it to be moved and operated in either a vertical or horizontal position. By changing the bale it can be used sideways with equal facility. Suitable handles are provided on front and back for the convenience of the operator in placing it over the work. The operating lever is so constructed and connected that the operator can control all movements of the riveter, whether standing at the side, back or front of the machine. No adjustment of the length of the dolly bar, or the rivet dies, No. 17, is required when riveting on various thicknesses of metal. The dolly bar has a movement of 4½ inches. The first 2¼ inches is known as the rapid movement, which is set down direct by the pressure from the receiver tank of 80 pounds. The last 2¼ inches is called the effective movement and developes the maximum pressure, giving a uniform squeeze throughout the entire stroke of the last 2¼ inches, which causes the hot rivet in the hole to be very nicely upset, filling the hole solid. This pressure is exerted on the dolly bar through the hydro-carbon fluid, which is non-freezing, and so long as the operating valve is open, admitting compressed air to the main piston, the maximum squeeze is maintained on the rivet. After a rivet is headed, the dolly bar and the die are positively moved back from it by a quick movement of the operating lever.

Every detail entering into the construction of this machine has been studied to make it as perfect as possible. It is made of the finest quality of materials with specially designed machine tools, and thoroughly tested before leaving the shops of the manufacturer. It is built in twenty-one different styles and sizes, for driving rivets from ⅜ inch to 1¼ inches. All machines are proportioned for using compressed air at 80 pounds per square inch, and to exert whatever pressure on rivets is required. Messrs. Manning, Maxwell & Moore, 85, 87, 89 Liberty street, New York City, are sole sales agents, and will be pleased to send descriptive catalogues and further information desired upon application.

Rear Admiral Melville, chief of the bureau of steam engineering, and Rear Admiral Bradford, chief of the bureau of equipment, are said to have presented to Secretary Long of the navy department reports adverse to the proposed consolidation of the bureaus of steam engineering, equipment and construction and repair.

SAFETY IN OCEAN TRAVEL.

The views of Capt. W. G. Randle, superintendent of the New York Ship Building Co. of Camden, N. J., on the subject of the dangers of ocean travel, as expressed by H. Phelps Whitmarsh in an article in the Century magazine, are of especial interest, as Capt. Randle was until recently in command of the American liner St. Louis. The remarks of the captain and the comment thereon is thus presented:

"There are two suggestions that I would offer in regard to making life on the Atlantic ocean safer than it is today. The first is the establishment of eastward and westward routes one degree to the southward of their present position. This, though it would increase the time of passage for an hour or so, would take vessels out of the greater part of the fog area. The second is the making of an international law which shall compel all vessels crossing the Atlantic, whether under steam or sail, either to follow the routes laid down or to give them a wide berth.

"The feelings of captains in regard to safety are not, as has been sufficiently proved, to be depended on. They should be compelled, under the penalty of losing their certificates, to comply with the law, particularly with regard to speed in thick weather. To this end it is suggested that all steamships be required to carry telltales in some part of the ship accessible to all, which will register at all times the rate of speed at which the vessel is going. It is an old saying that the captain who gives his attention to the four 'L's'—lead, log, lights and lookouts—runs but little danger of catastrophe. To this there should be added a fifth 'L,' standing for law. Finally, the steamship companies should be made liable for the human freight they carry. Why steamships, in contradistinction to railroads, should be allowed to consider accidents as an act of God, and, with the loss of the ship, be exempt from liability, is beyond my comprehension. Accidents, both afloat and ashore, are inevitable. Occasionally they are caused by conditions over which man has no control, but, in ninety-nine cases out of a hundred, they can be traced to some human error, and, in the interest of safety, all common carriers, whether they float, roll or fly, should be forced to take precautions, which only their liability will secure."

DISPOSAL OF THE PARIS.

Mr. Clement A. Griscom, president of the International Navigation Co., returned a few days ago from Europe and in speaking of the probable ultimate disposition of the wrecked American liner Paris, he said:

"We do not know how great the injuries are, and they cannot be determined until careful examination has been made. As you know, the ship was turned over to the underwriters some time ago, and they succeeded in floating her and getting her to dock under her own steam. Careful surveys of the vessel will be necessary to see whether they keep her. The law provides that if the value of the ship when she has been restored is greater than the amount of insurance plus the sum necessary to restore her, the underwriters must turn her over to the owners again. But if the value of the ship is not as great as the insurance and the cost of repairs taken together, the ship remains in the hands of the underwriters to dispose of as they choose. There are three things to be determined—the present value of the vessel as she lies in dock today, then the amount that would be necessary to put her in condition once more, and, last, the sum that she would be worth when restored to first-class order again. As the two sides in these surveys are likely to disagree on many points, it is to be supposed that the investigation will take some time and the result may not be given out for several months."

DEWEY NAVAL PARADE.

Preparations have been practically completed for the naval parade in honor of Admiral Dewey and the indications are that it will be the greatest pageant of the kind ever seen in America. The government has designated the following war vessels to take part in the parade: New York, Massachusetts, Indiana, Texas, Brooklyn, Lancaster, Marietta, Du Pont, Porter, Morris, Winslow and Stiletto. In all probability other vessels will also be assigned to this service later. A great number of applications for positions have been filed by owners of mercantile and pleasure craft of all kinds in New York. In addition applications have been received from ship owners in Portland, Boston, New Haven, New London, Bridgeport, Newburg, Albany, Poughkeepsie, Elizabethport, Baltimore, Philadelphia and Washington. All the principal steam yachts on the Atlantic coast will participate, headed by J. Pierpont Morgan's Corsair. Following the Corsair as a guest of honor will be the Erin, with Sir Thomas Lipton on board. Howard Gould has cabled the committee that he will bring his yacht Niagara over. The Prosto, owned by F. Adolph Mollenhaur, will be used as a dispatch boat for the formation of the parade. The committee expects to prepare a map of the bay and the North river showing the exact route of the parade and giving the position of each boat. It is expected that the line of vessels in the parade will be at least seven miles long and require three hours to pass a given point.

Some 100 tons of iron ore have been shipped from the Belmont iron mine, Ontario, to Glasgow as an experiment. An order was also received a short time ago for the shipment of 20,000 tons to Germany. These orders are the basis for the reports recently circulated to the effect that Belmont ore is likely to be shipped to Europe in extensive quantities as soon as the St. Lawrence canals are enlarged.

ITEMS OF INTEREST.

Salem, Mass., has in Nathan A. Bachelder a mariner who passed forty-eight years on the sea and made voyages aggregating 1,640,000 miles.

The conversion of the auxiliary cruiser Dixie into a training vessel for the practical education of landsmen in the navy will entail an expenditure of $50,000.

A handsome model of the battleship Illinois, now building at the yard of the Newport News Ship Building & Dry Dock Co., has been added to the collection in the corridors of the navy department.

There will shortly be published by the government printing office at Washington a new edition of the work "Standard Designs of Boats of the United States Navy." The volume will contain 195 photo-lithographic illustrations and twenty-nine engravings, and the edition will be limited to 1,000 copies.

A report comes from Baltimore that the Pennsylvania Railroad Co. is likely to add two steamers to the fleet of the Baltimore, Chesapeake & Atlantic Railway Co. It is the desire to constantly hold two vessels in reserve, a thing which is practically impossible under present conditions, since every vessel of the fleet is now in service.

Officials of the quartermaster's office, war department, have completed an inspection of the Ward line steamers Havana and Mexico with a view to recommending their purchase for transport service. The vessels were built within the past year by the William Cramp & Sons Ship & Engine Building Co. Both are speedy, one of them having made 18.46 knots on trial.

Estimates of the cost of establishing naval coaling stations in Porto Rico will be submitted to congress at the next session by Secretary Long. In all probability no recommendation will be made for either Cuba or the Philippines, but the department is very anxious to equip a station on the Porto Rican coast and will strongly urge an appropriation for that purpose.

The patent on a new type of ship rudder, recently granted to Frederick Baldt of Chester, Pa., the well-known inventor of a stockless anchor, is the subject of much discussion in shipping circles, and the opinion has been freely expressed that it will revolutionize the styles of helm in common use, inasmuch as it is one-third lighter than the old style and considerably stronger.

The United States navy department has just issued an order assigning Ensign C. E. Deligeorges to duty on the cruiser New York. Ensign Deligeorges is an officer of the Greek navy, and his assignment to an American warship is the result of the desire of his government to learn something of American naval methods. He will be to all intents and purposes an officer of the New York.

All the bids submitted for the construction of a dry dock at the League island navy yard have been rejected, by reason of the fact that the lowest proposal received allowed much question as to the intent of the bidder. This decision was only reached after considerable correspondence between the bidder in question and the department. The specifications will be changed in minor respects.

The report of the Blohm & Voss Ship Building Co. of Hamburg, Germany, for the year ending June 30, 1899, has just been made public. It shows that during the twelve months in question there were completed and delivered six steamers of 35,090 gross tons register and 13,800 indicated horse power. At the end of the year there were under construction eight merchant and one naval vessel. The average number of hands employed in 1898-99 was 4,425, as against 3,683 in 1897-98.

It begins to look as if the steel famine would necessitate requests for extensions of time from almost all ship builders holding government contracts. The George Lawley & Son Corporation has asked for a year's extension from Oct. 1 in building the torpedo boats DeLong and Blakely. Lewis Nixon, who is building the torpedo boats Nicholson and O'Brien at his Crescent Ship Yard, Elizabethport, N. J., reports that it is impossible to secure forgings and struts and that in all probability it will be necessary to ask for an extension of twelve months on his contract.

An eloquent testimonial of the class of work turned out from the yard of the Wm. Cramp & Sons Ship & Engine Building Co. is afforded by the Oceanic Steamship Company's mail steamer Alameda, which a few days ago completed her sixtieth round trip to Australia. Before she was placed on the Australian route, the Alameda made twenty-five round trips to Honolulu. In her sixteen years of service the vessel has traveled more than a million miles, but during the entire time she has not stopped at sea for repairs ten hours, all told, and has never been late. On the other hand she has frequently arrived in port ahead of time.

The Nickel Plate road offers the low rate of one cent per mile round trip to all military companies and uniformed bands in parties of fifty or more, desiring to participate in the celebration of the arrival of Admiral Dewey at New York City Sept. 29 and 30. Tickets on sale Sept. 26, 27 and 28; good returning until Oct. 2, inclusive. A rate of a fare and a third for the round trip will be made to individuals. Tickets available same dates as above and good returning until Oct. 4 inclusive. Inquire agents for further particulars. 143, Sept. 30

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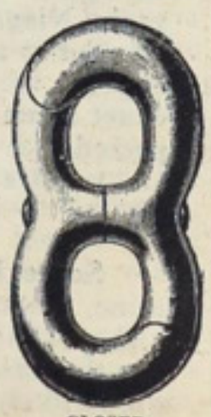
CLOSED.

TRADE NOTES.

The Webster, Camp & Lane Machine Co. of Akron, O., is shortly to build an addition to its machine shops.

Jas. McCreary & Sons of Toledo, O., are installing their ventilating and air purifying systems on the transports Thomas, at Cramps' ship yard, Philadelphia, and the Logan, at the Morse Iron Works, Brooklyn.

The National Tube Co. has just acquired the Pittsburg Tube Co. plant from Messrs. McCutcheon of Pittsburg and R. T. Crane of Chicago. The National company has also closed an important contract for the supply of material to the Crane Co. of Chicago.

President McKinney of the Niles-Bement-Pond Co. announces that Jas. K. Cullen has been assigned as manager of the Niles works at Hamilton, Frederick W. Gordon as manager of the Bement plant at Philadelphia, and A. C. Stebbins as manager of the Pond works at Plainfield.

The air compressor department of the Curtis & Co. Manufacturing Co. of St. Louis is crowded to its full capacity with orders. Their air hoists are becoming extremely popular, there being 150 orders for them on their books at the present time. Several shipments of air compressors were recently made to Europe, one going to Paris.

The American Steam Packing Co. of Boston, Mass., find that on account of their increasing trade in the west they must carry a stock of their packings in Chicago. They have therefore made arrangements with the Advance Packing & Supply Co., 55 S. Canal street, Chicago, for a general western depot, in which a full stock of their goods will be carried.

A cable order for a towing machine of the well-known Shaw & Spiegle kind, manufactured by the American Ship Windlass Co. of Providence, R. I., was recently received from the Ohrvikens Aktiebolag of Skelleftea, Sweden. One of these machines, as well as a Providence windlass and steam cargo winch, is to be furnished to the Wolff & Zwicker Iron Works for the steamer that is being built for the Alaska Packers' Association.

The Henri Nestle Co., manufacturers of Nestle's food, are establishing a large plant at Fulton, N. Y., for the production of their specialties in the United States. This firm has its headquarters at Vevay, Switzerland, and before establishing its plant in America, it had already constructed a similar plant in Sweden. The plant at Fulton, N. Y., will be fireproof, and of the most modern construction, using steel framework for the floors and roofs, with brick side walls, the floors being constructed of concrete supported by steel beams. The Berlin Iron Bridge Co. of East Berlin, Conn., furnished and erected all the steel structural work connected with this building, under the supervision of Mr. H. J. White, consulting engineer for Henri Nestle.

The high character and educational value of the literature issued by the B. F. Sturtevant Co. of Boston is well evidenced by the following extract from a letter recently received by them: "I am much indebted to you for a gift of a copy of your 'Treatise on Mechanical Draft.' It will be of much aid to me in the preparation of my hand-book. Previously when I have needed to consult it, I have made a trip of twenty-five miles to Syracuse to consult the copy in the Syracuse Public Library." This book is an authoritative work of some 400 pages, and deals not only with the problem of mechanical draft, but with all of the important factors concerned in steam boiler practice. Although originally issued for free distribution, the constantly increasing demand for this work has necessitated placing a nominal price of $1.50 upon it. The second revised edition has just been issued.

Iron mining companies on the Marquette range, Lake Superior district, have announced a voluntary advance in wages of 10 cents a day, taking effect Sept. 1. The increase affects both underground and surface men, numbering several thousands, with the exception of common labor on surface, which is advanced 5 cents a day.

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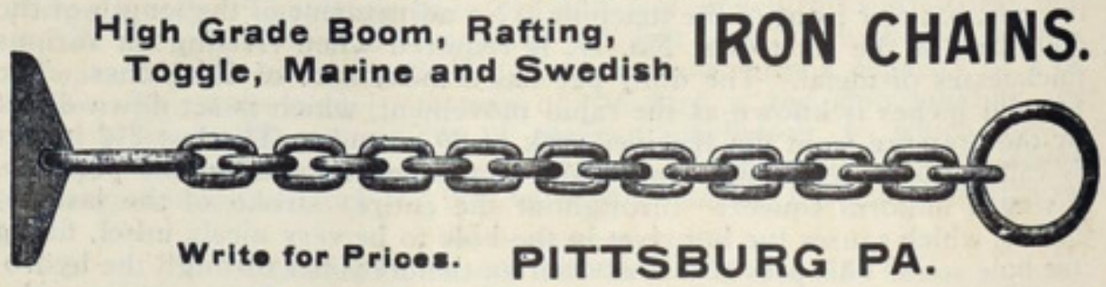

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American Steel & Wire, Pfd.....	97⅜	98½	97¼	98¼
Federal Steel	58½	59¼	58¼	59
Federal Steel, Pfd.....	81¾	81¾	81	81¾
National Steel	53½	53½	53	53½
National Steel, Pfd.....	97½	.....	.....	97½
American Tin Plate	40¼	40⅜	40	40⅜
American Tin Plate, Pfd.....	86½	88	86½	88
American Steel Hoop.....	39⅞	43	39⅞	43
American Steel Hoop, Pfd.....	84½	84⅞	84⅛	84⅞
Republic Iron & Steel	28¼	30	28¼	30
Republic Iron & Steel, Pfd	74½	74¾	74	74¾

AROUND THE GREAT LAKES.

It is reported from New York that an expenditure of about $30,000 will be required in repairs on the steamer Mae, built by the Craig Ship Building Co. of Toledo for Miller, Bull & Knowlton of New York, and which sustained serious bottom damages through contact with rocks in the passage down the St. Lawrence river. The Mae has been in dock at New York for some time past. It was found necessary to remove sixty plates and twenty frames from her bottom.

Another wooden freight vessel is to be put down at once at the ship yard of Capt. James Davidson, West Bay City, and it is more than probable, in view of the lake freight outlook, and in view also of sales of Davidson vessels recently, that three or four large carriers will be turned out at West Bay City before the opening of navigation next year.

Mr. J. T. Connery, manager of the Youghiogheny & Lehigh Coal Co. at Chicago, announces an advance in the price of steamboat fuel on the company's north pier dock. The new prices for Youghiogheny coal are $3.10 for screened lump, $3 for unscreened and $2.25 for screenings. "We are obliged to make this change in price," Mr. Connery says, "owing to the advance in lake freights on cargo coal from lake ports to Chicago of 60 to 70 cents a ton above last year's rates. Should freights be lowered before the close of navigation we will, of course, be pleased to reduce the price of coal correspondingly."

Certificates of stock in the Great Lakes Towing Co. (harbor tug consolidation of the lakes) have all been issued, and the organization is now fully effected, except, of course, as to the detail of management, on which General Manager Collier and President T. F. Newman have been engaged for some time past. The final purchase of the Dunham property at Chicago will tend to greatly simplify matters for the consolidation, which is now in full possession of everything in the way of tugs that the management started out to purchase. The retirement of Capt. Dunham certainly marks an important change in Chicago river towing. He had been in the business since 1856.

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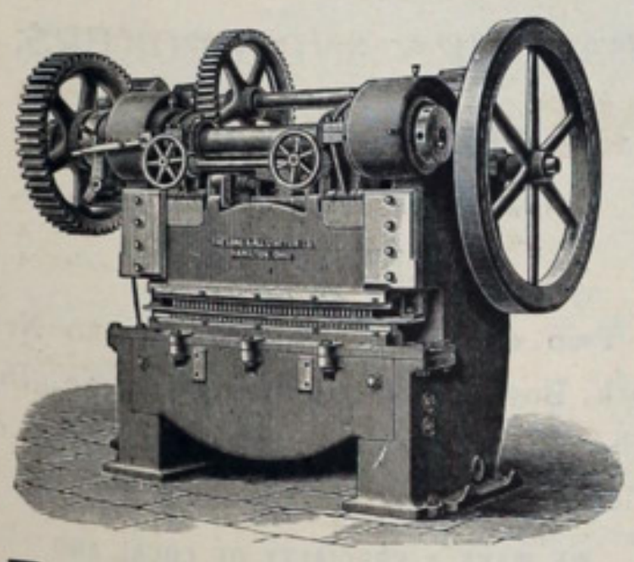
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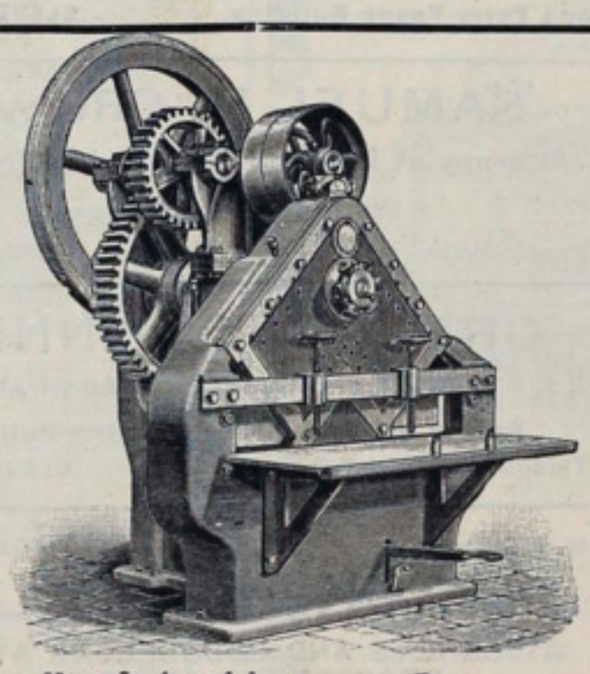
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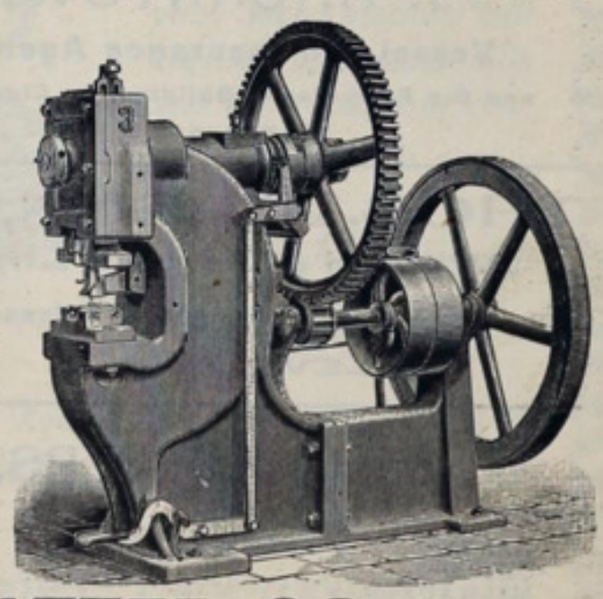
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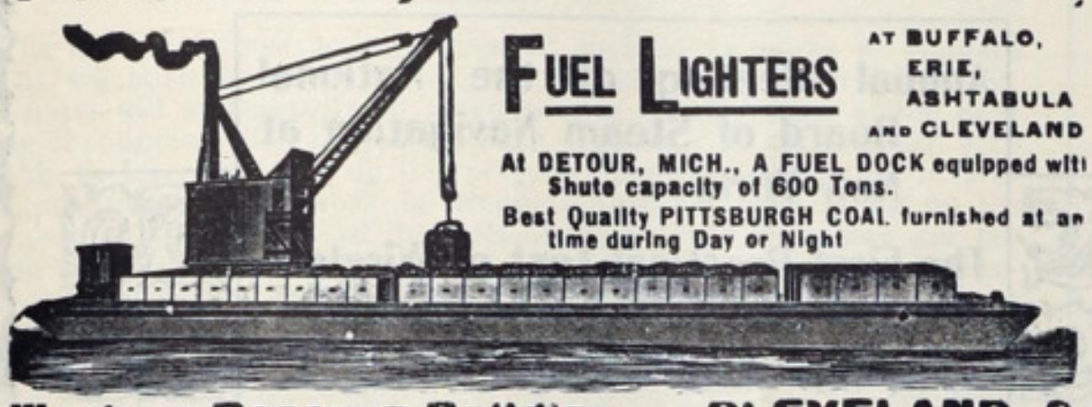

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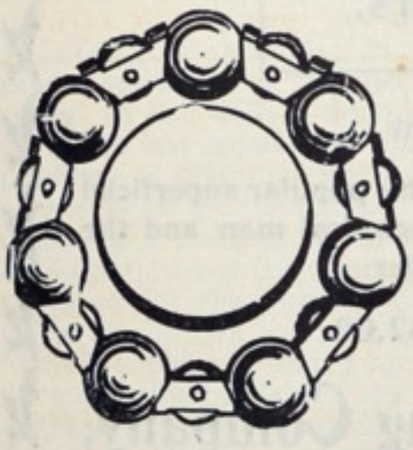

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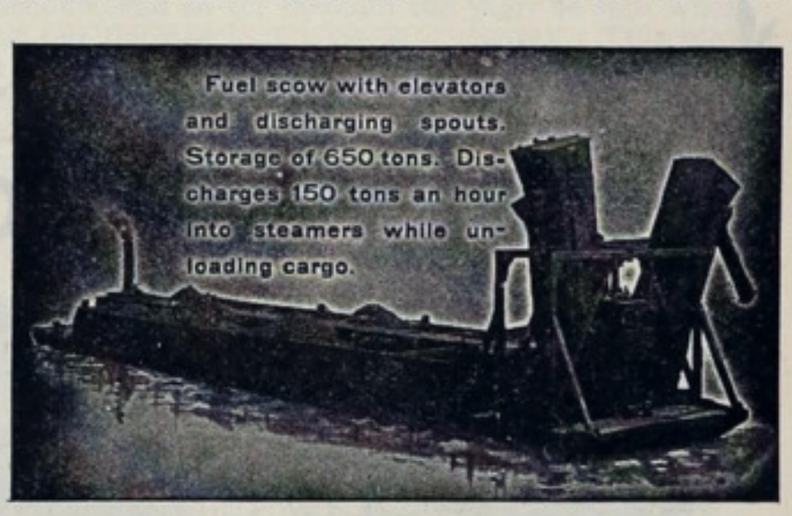
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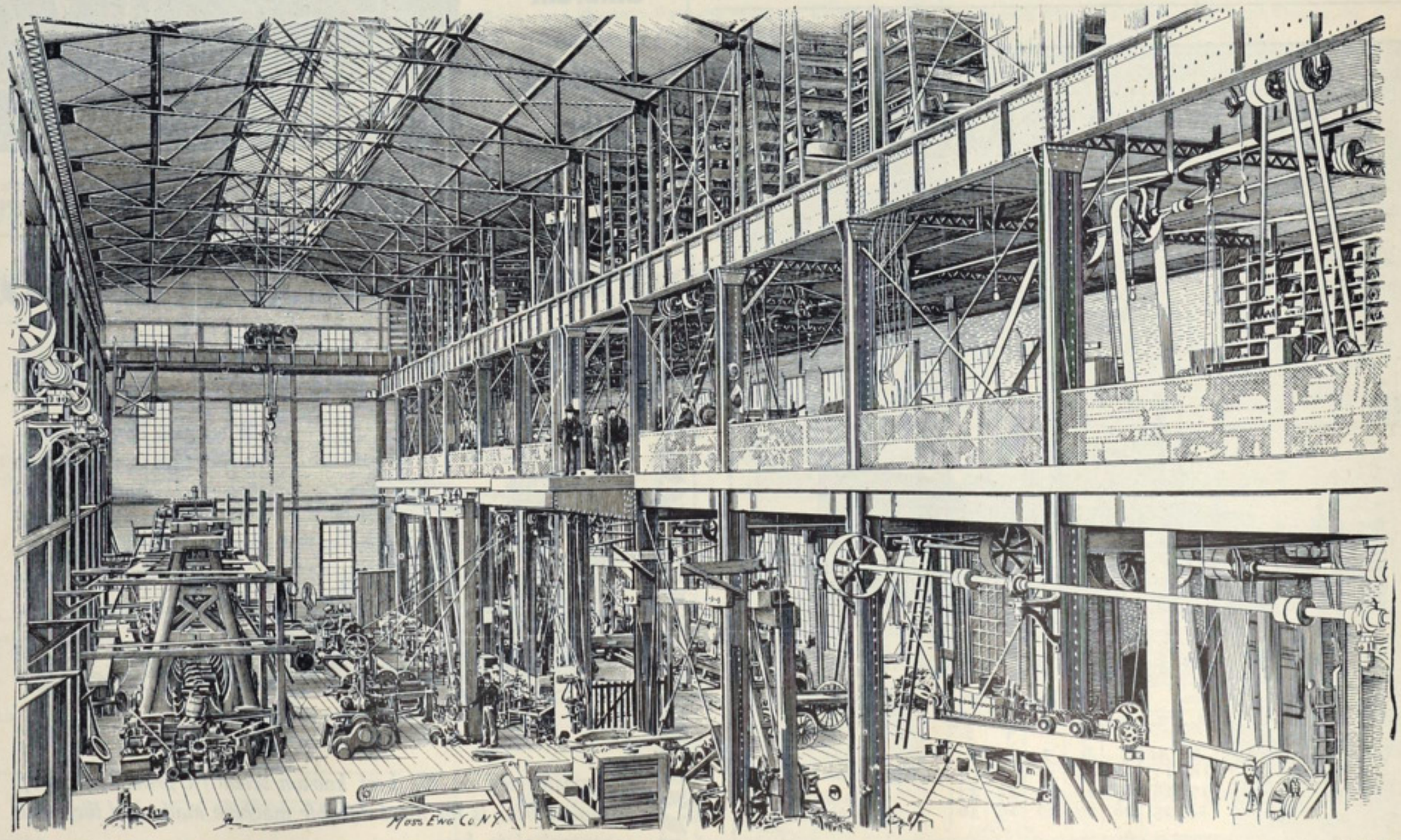

The above illustration is taken direct from a photograph and shows the interior of a Machine shop designed and built by us for the Dry Dock Engine Works, at Detroit, Mich. The central portion or Erecting Room is 40 feet wide, with a gallery three stories high on one side, this gallery being 27 feet in width. The upper floor of the gallery is used for storing patterns, while the second floor is used for light machine work—this lower floor being controlled by jib cranes, which also swing out into the central portion, thus delivering material from the wings by means of the jib cranes and the traveling crane to any portion of the Erecting Room. The whole framework of the building is of iron, with brick filling for the side walls.

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